

KEYBOARD MAGIC

Making music on your Electron



ROM cartridges: Complete survey

PLAY Compulsive board game and two arcade classics

LEARN! Find out how the Electron works

COMMODO







The Screen Editor.



The Character Editor.



by a Monster



The Time Bomb is located



The Poisonous Fungus grows insidiously



Collecting a Golden Crown

#### Are you ready for the ultimate challenge?

Our original Repton game was immediately acclaimed as a refreshingly new concept: a game requiring dexterity to complete its arcade-style elements, and clear logical thinking to solve its strategic puzzles. Repton involves retrieving treasure from cleverly-constructed traps of falling rocks whilst avoiding the fearsome monsters and haunting spirits. "This is an astounding game reaching new heights in BBC arcade adventures," enthused the Micro User magazine.

Last Christmas saw the release of Repton 2, larger and much more challenging than before. Acorn User's Technical Editor Bruce Smith wrote: "Repton 2 is better than anything I've played on the BBC Micro or Electron. Brilliant!"

Now, completely rewritten and improved for the Commodore, Amstrad, BBC Micro and Electron, we proudly present Repton 3. For the first time, a screen-designer is included: try to devise screens that will perplex your friends, then see if you can solve their newly-designed screens. Another innovation is the character-designer which enables you to design your own monsters, rocks, eggs, spirits, diamonds . . . any or all of the game's characters can be redefined as you wish.

Repton 3 is much larger than its predecessors — it has 24 fascinating screens, and players who are skilful enough to complete them all can enter our prize competition described below. All the favourite Repton characters have been retained, together with several new features: a creeping poisonous fungus which grows at an alarming rate; time bombs and time capsules (for puzzles in the 4th dimension); and golden crowns as well-deserved rewards for your endeavours. Can YOU complete Repton 3?

#### PRIZE COMPETITION

If you complete Repton 3, you can enter our competition. Prizes include over £200 in cash, with T-shirts, mugs, badges and pens for runners-up.

#### COMMODORE 64/128 . AMSTRAD CPC 464/664/6128 BBC MICROS: B, B+, MASTER, MASTER COMPACT . ELECTRON

Commodore Cassette......\$9.95 BBC Micro Cassette..... \$9.95 Commodore Disc.....£11.95 BBC Micro Disc \$41.95 Amstrad Cassette... \$9.95 Master Compact Disc......£14.95 Amstrad Disc. £14.95 Electron Cassette..... .29.95



**ACORNS**FT

The screen pictures above show the BBC Micro version of Repton 3.





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- within 24 hours by first-class post. Postage and packing is free. Faulty cassettes and discs will be replaced immediately.



#### News

All that's new in the ever-expanding world of the Electron.



#### **Adventures**

More tips, clues and magic spells from our resident wizard as he endeavors to help those stuck in far away and long-forgotten lands. 10

#### Software Survey

Operation Safras: An Impossible Mission or Treasure Hunt? Our frank reviewers give them a whirl.



#### Keyboard Player

Turn your micro into an Electron-ic organ and have fun creating merry melodies.



We show how a few simple commands can create an impressive graphic display.

#### Graphics

After seeing the PLOT it's up to you to DRAW your own conclusions.

27

### Hardware Projects

The second part of our series on expanding your Electron moves on to investigate the analogue port. 29



### Maze

Help Barney the bear escape from the creepy castle in this fast arcade game.

#### \*Trek

We evaluate a powerful disassembler that actually comments on the machine code! 27

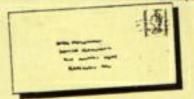
GCOL

Need extra colours on your micro? We show you how with this short utility.

# Tommy and the Toadstools

Guide Tommy home through the woods, but watch out for the poisonous toadstools – they're deadly!





#### Micro Messages

The pages you write yourselves. A selection from the many lively, interesting letters you've been sending us over the past few weeks. 47



Two short, yet most impressive listings from our clever readers.

55

#### **Basics**

Line numbers are needed in order to program in Basic.

58

#### Hardware

A whole host of cartridges and rom adaptors come under the microscope in this comparative review 60

Bargains galore!

Don't miss our special offers on Pages 50-53.

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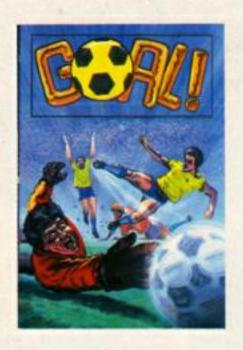
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#### GOAL! BBC/Electron

The first realistic football simulation for the Electron featuring excellent graphics, music and an intelligent opposition that actually adjusts its skill level during the game depending on current state of play.

cass. £7.95

## **FUTURE SHOCK**

BBC/Electron

An amazing new style of Arcade game with inter-active sub plots, using large detailed graphics for superb detail. This game pushes the machine and the player to unparalleled limits for many hours of enjoyment making this a game not to be missed.

Quote from Electron User:- December Issue.
"Future Shock is an excellent program, a game which overflows with character and humour." "Overall Rating 9/10"





## THE BIG K.O.

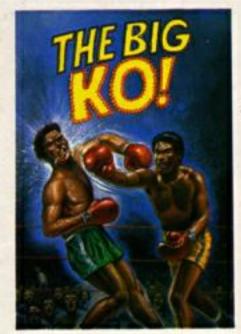
BBC/Electron

Finally a BBC/Electron Boxing Simulation of the highest quality. This game offers features until now not seen on Acorn Computers.

Superb sound, quality, super-size graphics, 6 progressively more cunning opponents and a multi-player mode will undoubtedly make this the Sports Simulation of 1987.



**NEW RELEASE** 



## JET SET WILLY II

BBC/Electron

Over 90 screens of this classic game will give even the most skilful player the ultimate challenge.



**NEW RELEASE** 







SCREEN SHOTS FROM VARIOUS COMPUTERS



## Data puts team on top

AN Electron is helping a pub football team show a clean pair of heels to its rivals in the local league.

In fact the machine has brought about a remarkable change of fortune for the Welcome Inn in a Greater Manchester Sunday league.

Last year they won only three matches. Yet so far this season, after losing their opening match, they have won 10 on the run.

Manager Peter Wright has been able to affect this dramatic reversal of previous form, with a little help from his Electron.

"I have the forthcoming week's opponents watched and the data recorded in the machine", he says.

"Also, I have written a program in which I can cross match our strengths with their weaknesses.

"And from this I work out the game plan.

"If an opposition player is reported to be nervous, then the computer suggests he warrants the attention of our

# Electron's rarity value shoots up

THE Electron is now the most sought after machine in the second hand market place.

So much so that the machines often change hands for up to 80 per cent of the current price tag.

News of the upsurge in demand for used Electrons comes from Micro Mart, the leading publication covering the second hand home computer scene.

"One of the reasons for this is that it is such a good machine that people rarely get rid of them", Stewart Summerville of Micro Mart told Electron User.

"Consequently when one does come on the market, it fetches a top price.

"If this trend continues then in years to come there is little doubt that Electrons will become collectors' items – and their value could then rocket".

A recent advertisement offering an Electron for sale

ELECTRON & PLUS III Disc Drive, also ROM box TZP3, Elkman, Stargraph, ROMs Database disc, games, books, etc. 10 discs. £180. Phone 0925 30097 ono.

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ELECTRON PLUS 1 E2P 2nd Processor, AP4 Disc In/face, View, 13 games tapes £210 onc. Tel. 0268 777324.

brought some 50 telephone calls within 48 hours.

"The phone never stopped ringing", said advertiser John Sturrock. "You would have thought I was giving away a Rolls Royce for free from the response.

"As it was, the first person who came on bought it for the price I was asking, though subsequent callers offered me more".

Meanwhile sales of new Electrons are reported to have been heavy over the Christmas period.

Recent adverts in Micro Mart

E2P 2nd Prolace, View, 13
no. Tel 0268

ELECTRON COMPUTER PLUS
one, I/F Currana DFS & Drive &
View Word Processor, all for only

£160 + P&P. Phone 01 550 8965.

**ELECTRON PLUS 1 Cumana Disc** 

In/face, Electron User's, lots of

s/ware incl. View, \*T2CU, all £170

Tel Northampton 0604

"It's a machine whose popularity never seems to wane", said one retailer.

"Fortunately there are some very clever peripheral people in this sector of the market who are constantly enhancing the Electron to keep it up to date.

"And it is also well supported in terms of the software available.

"All of this adds up to the fact that there is little doubt that this is one of the most successful machines in the history of home computing".

## A CHESS CLASSIC FOR THE ELECTRON

THE CDS Software classic Colossus 4 Chess has finally been made available for the Electron.

The program earned its fame by defeating 24 other computer chess games in a gruelling series of 16-game matches and it's generally

acknowledged to be the strongest of its type on the market.

With its backtrack facility, problem-solving mode and handicapping feature, Colossus 4 Chess provides beginners with a friendly tutor and veteran players with a tough opponent.

The program was written by Martin Bryant, author of White Knight 12 – coincidentally one of the games beaten by Colossus 4 Chess. Cassette price £9.95.

Also new from CDS is Brian Clough's Football Manager, a combination board and computer game simulating the trials and tribulations of a soccer boss.

Two to five players can take on the role of team manager competing against each other and the computer. Price £14.95.

## **Hits from** combined forces

THANKS to recent cooperation between two leading software houses, Electron owners can now buy eight top-selling games at a fraction of what they cost when they were originally issued.

Acornsoft and Superior Software have combined forces to produce Acornsoft Hits Volumes 1 and 2.

Volume 1 contains Magic Mushrooms, Planetoid, Maze, and Monsters. Volume 2 includes Starship Command, Arcadians, Meteors, and Snooker.

The dual cassette packages cost £9.95 each.

Superior Software managing director Richard Hanson told Electron User: "These are quite definitely the best compilation packages ever produced for the Electron.

"Previous compilations have got to number one in the software charts, and I'm sure both volumes of the Acornsoft Hits will also.

"It's hard to say which package will prove the most popular - we've aimed at achieving an equal balance, with Magic Mushrooms heading Volume 1 and Starship Command the prime title on Volume 2".

## Sporting Electron

#### From Page 5

player known as King Kong. "With a bit of luck thrown in as well, we seem to have got

it licked".

Regulars at the Welcome Inn who support their team have been amazed by the way their lads have improved.

"They were a total load of rubbish in the past", one told Electron User.

"But this computer thing seems to have spurred them on in a way I would have thought was impossible before.

"It's not turned them into a team which would worry Manchester United, but they'll do for us".

## It's showtime again

THE record-breaking Electron & BBC Micro User Show returns to Manchester next month for the fourth

The show will take place at the Renold Building, UMIST on March 20, 21 and 22.

The Northern showcase for all that's new on the Electron scene looks set to be an even greater success than its predecessors.

More than 10,000 enthusiasts visited the last Manchester show, held in September.

Organiser Database **Exhibitions** is confident that an even larger number will attend the coming event, which has

over 70 companies exhibiting and a host of new products available for the Electron.

Once again the Acorn Theatre will be a prominent feature of the exhibition, and leading micro experts will be on hand to provide information on the latest peripherals and software.

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Roscous Prat	020986	234	4.9	98.44					

## Caring for your TO serve the growing army of stocks..

stock market investors with moderate means, Squirrel Software has added to its

Care Utility series.

Investment Care for the Electron is also for experienced investors, but it has been inspired by recent public share offers.

"The program has been written with the new breed of more modest holders of TSB, British Telecom and British Gas shares very much in mind", Squirrel managing director Alan Turner told Electron User.

"It produces several statistics which should help these people decide when best to sell in order to convert their paper profits into cash".

Investment Care keeps track of unit and investment trusts, stocks and shares, producing displays of purchase and bid details for each

investment.

Printouts of current holdings, sales in current tax year, and dividends received are available.

Offer and bid prices are easy to enter, and the true position of the user's portfolio can be seen at a

Investment Care costs £13.95, or £24.95 when bundled with Cash Care, **Building Society Care and Vat** Care utilities.

## Rombox winners

MANY thanks to the 711 readers of Electron User who sent in entries for the Slogger Competition in the November issue.

It took quite a while to read every single slogan, but eventually we chose 15 top class entries. The prizes are already on their way to the winners.

First prize: A Rombox Plus and Starword to Joseph Hornsby, age 12, from Torquay for "Slogger Ltd Opens the Gates to Genius with Exceptional Results".

Second: Rombox and Starword to Andrew Hardy, age 13, from Dorset for "Slogger Leaves Others Grounded by Everything Right".

Third: Rombox and Elkman to lan Cameron, age 32, from Inverness for "Still Leading Others at Generating Goods for the Electron Range".

Other prizes: Mark Bullard, Plymouth; V Hayter, Milton Keynes; B L Smith, Slough; Lex Lagoon, Kent; Trevor Coatsworth, Cleveland; C Shipton, Bristol; Timothy Medcraft, Faversham; Richard Gibson, Winchester; David Moore, Clwyd; Adamou, Brentwood; Chay Ireland, Northants; Simon McCormick, Strangford; Douglas Cartwright, Ilford; M.D. Russell, Newton Abbot; Simon Hopkins, Retford.

#### CHART-TOPPER FLIES IN

LATEST release for the Electron from Bug-Byte is Skyhawk, a shoot-em-up game that has been a chart topper on other micros.

Converted by Tennis author

Margaret Stanger, it requires the player to protect his Skyhawk fighter plane against flights of enemy aircraft scrolling over the screen. Price £2.99.

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Mathematics 2 age 9 upwerds

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Mathematics 1 & 2 above

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Now, thanks to the power of the E2P Second Processor, Electron users can run the most popular BBC wordprocessor – Computer Concept's WORDWISE PLUS. PMS programmers have re-written the MODE 7, WORDWISE screen handling, and keyboard routines to work on an Electron with E2P.

Not only this, but because a Second Processor is being used, a massive 42K - yes! over 42,000 characters - of text can be handled, with PREVIEW ALWAYS in an 80 column MODE!! Add to this the fact that E2P WORDWISE PLUS is totally disk based, requiring NO ROMS

or cartridges.

E2P WORDWISE PLUS is a full implementation of the original WORDWISE PLUS, with all the SEGMENT MENU features maintained. WORDWISE files created on a BBC can be loaded into the Electron and vice versa.
PMS are offering E2P WORDWISE PLUS at an introductory price of

ONLY £39.95 (Inc VAT & delivery).

E2P WORDWISE PLUS is supplied on 3.5" or 5.25" disk (state size & DFS format, when ordering) together with full WORDWISE documentation. E2P WORDWISE PLUS is available ONLY from PMS. NOTE: This is a special version of WORDWISE which will NOT run on a BBC or unexpanded Electron.

PMS overseas dealers: VELOBYTE COMPUTERS, Schiedamsedijk 5A-6A, 3011 EB Rotterdam, Netherlands.

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"The AP4 should be considered the standard interface for the Electron".

Acorn User, July '86

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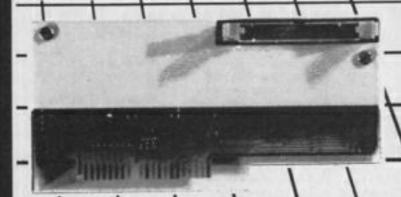
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ELECTRON USER, JUNE '86



03 TEK Sidewaya Rem Adaptor For Acom Computers देखीरचाराडच्ये देखारा वी

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THE ADVANCED ROM ADAPTOR II

The Advanced ROM Adaptor II

Our versatile cartridge continues to grow in popularity and demand. This ROM/EPROM adaptor is a quality product fully enclosed in an Acorn approved casing, providing full protection for your valuable firmware! A.R.A. 2 not only allows 8K (2764) & 16K (27128) ROMS/EPROMS but also supports 27513 & 27011 devices (when used with the correct software) for which we are currently devoloping new products. Fully compatible with the Master Computer & Electron Plus I

SERIAL PARALLES

#### THIS IS WHAT ELECTRON USER SAID ABOUT A.P.5:-

"Looking at the A.P.5. shows it to be constructed to a high standard, it looks solid and robust.

The A.P.5. Interface opens up the new Electron for a whole new type of computing. "E.U Dec '86

## ZIVIX MUUUSE

#### POINTS THE WAY FOR THE ELECTRON USER

**AMX MOUSE** 

Catch an incredible AMX MOUSE! The advanced opto-mechanical device that brings to your ELECTRON facilities once only available on more expensive computers. Now you can use ICONS, WINDOWS, AND POINTERS in your own programs.

**AMX PACKAGE** 

Plug the MOUSE into the user port, and the EPROM into your A.P.5. The latter contains fast machine code routines for creating on-screen windows, icons and pointers. And means that the MOUSE buttons can be programmed for use with commercial software such as Wordwise and View. There are two manuals included, explaining how to operate the MOUSE and the ROM routines, which are available in both basic and machine code programs.

Included in the package are two superb programs:

AMX ART has to be seen to be believed! It's a computer-aided drawing program that's just as good for serious applications - such as the preparation of detailed architectural and engineering drawings or teachers' worksheets - as it is for having lots of family fun! And if you're artistically inclined, you'll be astonished at the quality of work you can produce and save. It makes full use of on-screen menus, pull-down menus and icons: the ideal, easy way for novices to learn and gain in confidence.

ICON DESIGNER is an invaluable program for creating and storing icons for use in your OWN programs.

The ACP/AMX mouse package may be used on an ELECTRON fitted with a PLUS I & AP5. The 'ART' software is supplied on cassette but can be transferred to DISC (DFS not ADFS)

£69.95

MOUSE PACKAGE + AP5 £125.00

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oa

16h EPROM Advanced Disc Toolkit containing over 30 commands

## Advanced

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THE FOLLOWING ACP PRODUCTS **Advanced Disc Toolkit** Advanced Disc Investigator Advanced ROM Manager Advanced 1770 DFS AREALL



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(03) /M/E+1/ £14.95

An Acorn approved cartridge containing a card with special 'zero' profile sockets that allow you to fit compatible 8K or 16K EPROMS/ROMS. The cartridge is fully enclosed providing complete protection for your ROMS. Simple to use -no switchingcomplies fully to the Acorn (sideways) Rom Filing System. A.R.A.2 contains 2 sockets.... A single adaptor is also available...

A.R.A.1 (02) /E/£10.35

"The best ROM cartridge is by far the A.C.P. A.R.A.2" A&B Computing

ADVANCED SIDEWAYS RAM (04) /E+1/

A highly versatile but simple to use s/w RAM cartridge that is automatically write protected on loading. Contains 16K RAM but can be switched (externally) to 2 X 8K RAM. Supplied with instructions & full software support (on cassette) to save ROM images to disc/tape, load RAM from file, Advanced Print Buffer & MakeRom a utility to merge several files from disc to be run from the ROM FS.

(S/Ware on disc : please add ... £1 5% DFS .. £2 3% ADFS)

ADVANCED ELECTRON DFS

(05) /E/ £24.15

Electron & Plus 3 users ... gain BBC compatibility by adding the Advanced Electron DFS (1770 DFS) this is the same disc filing system supplied with the BBC B+. Now you can produce and access (compatible) BBC disc based software. A.C.P. also supplies 51/4" disc drives to add to your Plus 3 (inc. 2nd. drive adaptor). "ACP has produced another superb ROM for the Electron" .. Electron User Feb '86

(supplied on 16K EPROM + DFS MANUAL)

ADVANCED DISC INVESTIGATOR (06) /M/B/E/C/

A very powerful Disc utility for standard & non-standard discs. Backup most protected discs, edit any type of non-standard disc, check & repair faulty tracks, create new disc formats, copy 40track discs to 80track discs, verify two non-standard discs.

("ADI features an extremely comprehensive sector editor, and one of the finest I've seen'

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(supplied on 16K EPROM + manual)

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(07) /M/B/E/C/ £14.95

A friendly utility for ROM & sideways RAM. Examine ROM/RAMs, load files into RAM, move memory to/from SWays ROM/RAM, catalogue/kill ROMS, offer commands to specific ROMS, save ROMs to disc/tape, AUTOROM a file (inc. BASIC) to run from SWays ROM/RAM, execute specific machine code subroutine in a ROM, generate a ROM's checksum & CRC.

\*Representing amazing value for money. Go out and buy this real bargain." E.U Dec '86

**ADVANCED PLUS 4** 

(08) /E+1/

£79.98

'Disc drive compatibility at long last" Electron User June '86. "The AP4 should be considered the standard interface for the Electron" ... Acom User July '86. This sums up AP4 & ACP's approach to producing products. AP4 is a fully ACORN compatible disc l/face & will accept any standard drive inc. PSU, runs 1770 DFS (as fitted in the B+ & Master), keeps page & EOO, utils in ROM & provides a spare rom socket. "ACP's Plus 4 comes out on top. I can recommend it to Electron User, June '86. anyone . AP4 packages + D/Drive, AP4 100/AP4 400 **ADVANCED PLUS 5** 

(09) /E+1/

£66.70

A triple interface cartridge providing. 1) a TUBE i/face allowing a second processor to be connected, increasing BOTH speed & memory (PAGE &8ee HIMEM &8eee in all modes)

2) a 1 MHz BUS for control applications & prommers

3) the USER PORT for mouse and graphic devices.

Also contains 2/3 ROM sockets and on board operating software for 2nd processor.

**ADVANCED 1770 DFS** 3 versions ADM (11) - ADB (12) ADE (13)

£34.50 ACP have totally re-written the Acom 1770 DFS, enhancing existing features & adding new ones. The result is probably the fastest & most powerful disc fliing system your computer could have. With the ability to operate in double density occupying both sides of the disc (640K). Automatic file relocation, improved file handling, 62 file catalogue and Sways RAM can be used as a fast RAM DISC

\*An excellent buy for users with a 1770 Disc controller" M.U Dec'86

ADVANCED ELECTRON DFS Egg (14) /E+ASR/ £19.99

An alternative to our AED(05) for Plus 3 and ASR users. This optional alternative DFS is designed for use in Sideways RAM (ASR) and allows the user to operate a disc filing system

&Eee when using the Plus 3 (in ADFS page would normally be &1Døø). The DFS is simply loaded using the software supplied with the ASR from disc. (optional upgrade for existing AED users £9.50 on return of original EPROM)

(3 1/3" ADFS disc + manual)

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PRODUCT

Equipment codes /M/ = Master /B/ = BBC /E/ = Electron /E+1/ = Electron + Plus 1 /C/= Compact

(PRODUCT No)

Please send order to Advanced Computer Products Ltd. 6 Ava House, High Street, CHOBHAM, Surrey, England GU24 BLZ Tel 0276 76545 (mail order only) All prices include UK delivery and VAT.





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(in event of any query please include your tel. no.)

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QTY

CREDIT CARD No. EXPIRY DATE (Ref E21)

(0)

TOTAL

# Your chance for immortality

BIG news this month! Larsoft, a brand new adventure software house specialising in the Electron, has been formed by Geoff Larsen who will be a familiar contributor to regular readers.

Based at 4,Chantry Road, Clifton, Bristol BS8 2QD, to date Larsoft has released three titles: The Rising of Salandra (a two part fantasy), Wychwood and The Nine Dancers.

After some hours plotting my way through the third of these I have to conclude that it is superb value for money at only £3.95.

All three adventures are very professionally packaged and from previews appear error and bug free.

Not to be outdone, a passing raven told me that Potter Programs has recently released six new adventures.

There's a pack of four, including Inner Space, Hexagram of Trutania Valley, Stranded on Iloofrax and Philosopher's Stone for

only £5.95.

And the other two titles, priced at just £2.95 each, are Flint Strikes Back and Grounded.

If these adventures follow the standard of Twin Orbs of Aalinor they will be well worth buying.

Meanwhile, news from Essex is that Shards is offering the first six people to complete its adventure, Operation Safras, the honour of being characters in the next blockbuster release.

This is your chance to be immortalised on software!

Two more regulars to this column, Harry Bastien and Les Shipton, have earned themselves the distinction of officially becoming the first adventurers to conclude Robico's Myorem.

They now go into a final draw for that £100 first prize. May I offer my sincere congratulations to both of them and add that they beat me to it by a fair number of days!

While on the subject of Robico - a runner from South Wales brought me a scribbled note from Rob O'Leary to say that complete hint sheets are now available for Rick Hanson and Project Thesius.

To obtain one, all players need do is return their old help cards with a stamped addressed envelope.

It will come as no surprise to readers of this column and connoisseurs of text adventures to see that Robico dominates the top ten in popularity.

The only reason that Myorem isn't number one, in my opinion, is the relatively short time it has been available.

It's good to see old favourites such as Sphinx and Sadim Castle still up there in the chart.

But it's perhaps surprising to see Epic toppled so violently – where is Kingdom of Klein or Quest for the Holy Grail?

I also find the great popularity of Terrormolinos and Hampstead interesting – it proves that we have a sense of humour!

Don't forget that this is your chart so keep those votes coming in and the next Top Twenty should appear in three months time.

I would like to thank Emma Rutherford of Nene College for her superb maps to Philosopher's Quest and Circus Adventure. There's a copy of Myorem on its way to you, Emma.

And there is a copy of Adventure Soft's Rebel Planet waiting for the first full solution I receive to Castle of Riddles – I am absolutely flummoxed by this one.

I have just received Robico's Enthar Seven.

I know that the Mad Hatter has already reviewed this adventure, but I must just



add that if you want an excuse for buying a disc drive, then this is it!

Sheila Beattie has suggested that to help readers when ordering back issues of Electron User, I should mention the issues where help has been given for certain adventures.

It would be impossible to do this for all adventures, but I will occasionally do it for the more popular games.

Here goes: Help has been given for Woodbury End in the following issues of Elec-

#### **OVERTURE AND BEGIN**

Last month I suggested that you take an exploratory ramble through your new adventure.

However, if you want to achieve a modicom of success as an adventurer, progress must be much more methodical.

When Theseus slew the Minotaur in the labyrinth of Minos he ensured his safe return by leaving a trail through the maze with a ball of wool.

Like Theseus (unless you have a photographic memory) it is almost obligatory that you make a map of your route.

Essentially there are three types of map for solving text adventures – grid, random and logical. The first two are pictorial representations, the last a written route.

Once I have explained

#### KNIGHTS OF THE ROUND TABLE

This section is devoted to more experienced adventurers who have offered their services to other readers having difficulties with specific adventures.

If you write to one of my Knights please remember to enclose a stamped addressed envelope.

Kneel and rise:

Sir Toby Edwards of Woodhill Cottage, Neighbourne, Oakhill, Nr. Bath, Avon BA3 5BQ, who offers help with:

Adventure, Adventureland, Stolen Lamp, Woodbury End, Spiderman, The Incredible Hulk, Mystery Fun House,

Pyramid of Doom, The Count, Wizard of Akyrz, Wheel of Fortune, Castle Frankenstein, Quest for the Holy Grail, Classic Adventure, Kingdom of Klein, Philosopher's Quest, Super Agent Flint, Eye of Zoltan, Galadriel in Distress, Pettigrew's Diary, Five Stones of Anadon, Stranded, Terrormolinos, Ghost Town, Castle Quest, Ring of Time, Twin Kingdom Valley, Gisburne's Castle, Bored of the Rings, Castle of Riddles, Greedy Dwarf and Fantasia Diamond.

What do you do in your spare time Toby?

#### TOP TWENTY

- 1. Rick Hanson (Robico) 93%
- 2. Woodbury End (Shards) 90%
- 3. Project Thesius (Robico) 89%
- 4. Terrormolinos (Melbourne House) 88%
- Hampstead (Melbourne House) 85%
- 6. Ferryman Awaits (Kansas City) 81%
- 7. Twin Kingdom Valley (Bug Byte) 76%
- Sphinx Adventure (Acornsoft) 75%
- 9. Myorem (Robico) 72%
- 10. Wheel of Fortune (Epic) 70%
- Twin Orbs of Aalinor (Potter) 69%
- 12. Countdown to Doom (Acornsoft) 68%
- 13. Philosopher's Quest (Acornsoft) 64%
- Incredible Hulk (Adventure Soft) 61%
- Savage Island 1 (Adventure Soft) 60%
- Classic Adventure (Melbourne House) 59%
- 17. Castle Frankenstein (Epic) 56%
- 18. Dracula Island (Kansas City) 54%
- 19. Rebel Planet (Adventure Soft) 53%
- 20. Sadim Castle (M&P Software) 51%

tron User: February, April, June, July, August, September and December 1986, and January 1987.

Help for Twin Kingdom Valley has been offered in: June, July, November, 1985. December Also January, February, April, September 1986 and January 1987.

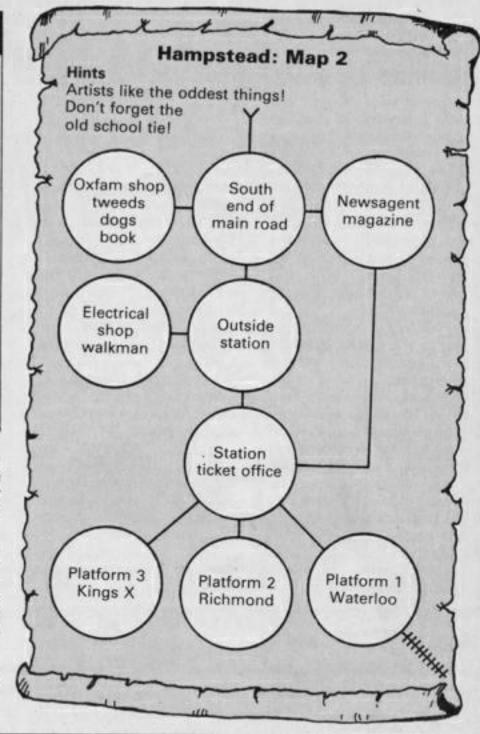
I hope that is of use to quite a few people.

I received a very interesting letter this month from

Mrs Pat Winstanley. She runs a club and magazine called Adventure Contact for authors of home-penned adventures.

If any of you are taking seriously your Quill, Adventurescape or Graphic Adventure Creator, or are interested in writing your own machine code adventures then write to:

Adventure Contact, 13 Hollington Way, Wigan WN3 6LS, for more details.



#### NERS

each, you can choose the type most suitable for you.

Let us begin with the grid map: Presuming that you do not yet possess one of my adventure mapping grids which I mentioned last month, you need to equip yourself with a piece of graph paper, a pen and a ruler.

Let each 2cm square on the paper represent a possible location in your adventure.

If you are a little unsure of your compass directions, draw a small diagram on the edge of your graph paper (North going up, East going right and so on). For simplicity we will call each location you visit a ROOM.

Begin playing your adventure and in the centre square of the paper inscribe briefly the room

description.

For instance in my example from Sphinx Adventure in Figure I, I have called the first location Top Mountain.

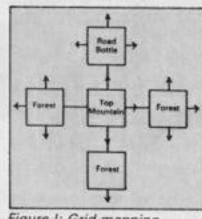


Figure 1: Grid mapping

Now take note of any information you are given referring to your various exits. Mark small arrows from your square in the direction of the available routes.

As you travel around,

mark the new places you find in the relevant adjacent squares to your starting room.

For instance, moving South, East or West from Top Mountain I find I am lost in a forest, yet travelling North I discover a road.

It is also essential that you note in the appropriate squares any objects or treasures discovered. Thus in the first room north I find a bottle - which I also

I remember vividly when exploring Quest for the Holy Grail, I found myself in a cave with an open hole in the roof but no means of reaching it. I then remembered a ladder I had seen at a much earlier room.

Thankfully I had noted its location and a quick sortie back enabled me to take the ladder and progress up through passages in the cave.

If you run off the graph, simply start on the opposite edge of another sheet of paper and mark reference arrows to show where sheets join.

The same applies if you ever have to climb up or down. You simply start in a corresponding square on a separate sheet and make that paper level +1 or -1 and so on.

This mapping technique works with all adventures which follow logistical compass routes such as Rick Hanson or Castle Frankenstein.

But for others like Classic Adventure you will need to adopt a random mapping procedure. For that you will have to read next month's column!

#### From Page 11

#### PROBLEMS SOLVED

W.E. Trevelyan has supplied a superb listing to cope with the bug in the save game facility in many copies of Woodbury End.

Early versions of this game allow you to save your position and later reload it but don't allow you to go on with the game and save a later position.

This listing is an alternative to the loader program with the loading screen eliminated.

It enters data into zero page, loads the main program, inserts the oscli routines for save/load and runs the main program.

Data files can then be saved and reloaded any number of times during the game.

Type in Program I, save it with the filename LWOOD then type in:

PAGE = &5880 CHAIN "LWOOD"

When it has loaded insert your Woodbury End tape.

I am also grateful to Damon Wingfield for his plethora of tips and solutions to a variety of adventures, including Voodoo Castle, T.K.V., Secret Mission and Sorcerer of Claymorgue Castle.

I shall pass these on in due course to readers who have difficulties with these adventures.

I must point out that I am unable to give any help with Myorem until after 30th April, which is the closing date for Robico's competition.

Then, judging by demand, I may just do a special on this superb

18 REM Woodbury Save	e\$)
28 REM by W.E. Trevelyan	600 NEXT
38 REM (c) Electron User	
48 REM PAGE must be &5888	618 start=&5288:end=&5888
58 MODE6	628 \$&B18="SAVE"+" "+file
500 7481=449:7488=45E:748	\$+" "+STR\$ "start+" "+STR\$"
3=&4E: ?&82=&54: ?&85=&4F: ?&8	end
4=&4C:?&87=&28:?&86=&F8:?&8	638 RESTORE1818
9=449:7488=498:748B=44F:748	640 FOR 11=0 TO 4
A=&16	658 READ byte\$
518 ?&7B=8	668 1X?&3846=EVAL("&"+byt
515 VDU23;8282;8;8;8;	e\$)
528 REM	670 NEXT
530 *LOAD WOOD	680 REM
548 file\$="DATA"	698 *TAPE
550 \$&880="LOAD"+" "+file	700 CALL &490C
\$	988 END
568 RESTORE 1888	1000 DATA A2,00,A0,08,20,F
578 FOR IX=8 TO 6	7,FF
580 READ byte\$	1018 DATA A2,18,4C,7A,38
598 11743878=EVAL("&"+byt	

Program I

adventure.

While on the subject of specials, next month I aim to give extended help -

including a cassette offer – on The Ferryman Awaits, which seems to be foxing a lot of people.

QUAL-SOFT

## THOUGHTWARE

Sports simulations

#### SOFTWARE THAT CHALLENGES, SOFTWARE THAT LASTS!!

Way back in 1983 we introduced LEAGUE DIVISION 1 for the BBC Micro. In September 1984 the original version of SOCCER SUPREMO, an Electron Version of this game, was introduced. In both games you become the manager of a newly promoted 1st division team, which you have to build up into a challenger, and hopefully winner, of the 1st Division Championship. The game uses professional simulation techniques which produce a true, natural management simulation rather than the simple minded mental arithmetic exercises of other "simulations". This caused this response:

"Hugely enjoyable but dangerously addictive" says Dr. Trevor Harley, Department of Psychology, University of Warwick

(He's bought four of our soccer management games)

YOU AIN'T SEEN NOTHING YET!!

WELL DR HARLEY YOU AIN I SEEN NOTH
THE NEW

TAPE 1 6 Seasons League Division 1 The F.A. Cup

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#### A SOCCER MANAGEMENT SIMULATION

#### WE'VE ADDED NOTHING TO THE COST!

The new SOCCER SUPREMO is supplied DIRECT from Qual-Soft on a same day basis. TAPE 1 + TAPE 2 + MANUAL, P&P and VAT still costs £9.95. Owners of the original SOCCER SUPREMO can obtain a £5.00 rebate by returning their tape with their order. Include payment for £4.95

QUAL-SOFT Dept. EU, 18 Hazlemere Road Stevenage SG2 8RX

Tel: 0438 721936 Please supply: SOCCER SUPREMO for my Electron Name:

Address:

Access No. (if applicable)



You're on your own in Occupied France — facing the toughest test that a British pilot has ever had to experience!

DATABASE SOFTWARE

The year is 1943. As an RAF officer stranded in Occupied France you have one aim — to get back to Britain.

The only way to do this is to try to pass as a Frenchman, but if your French isn't good enough you risk capture and interrogation by the police or even the Gestapo.

Even the simplest tasks — from buying food to taking buses — place you at risk. And to add to your problems you've got limited funds: "Should I hitch a lift or take the train?", "Do I sell my belongings or get a job?"

Whatever you decide to do, time is short. And there are always people willing to denounce you . . .

French on the Run is that rare combination: A truly educational program that's also a thoroughly enjoyable game. This text adventure not only tests your grammar and vocabulary, but your knowledge of France and the French way of life.

And as your French improves the language problems get harder and the situations become progressively more dangerous. There are four routes to complete in sequence — you need the password from the last before attempting the next. The standard of French required is about 0 level, though on the last route it rises to just below A level.

And there's a chance for you to try out the French you'll learn in practice:
We are offering a FREE WEEKEND IN PARIS as a prize to the first person to
get back to England alive, having broken a code near the end of the final route.

For teachers: French on the Run uses multi-choice questions with randomised distractors, all carefully chosen to illustrate linguistic points or points concerning things French. The program is meant for individual assessment, but can be used just as effectively for classroom work. A sealed envelope contains details of how the secret passwords are created.

**TO ORDER TURN TO THE FORM ON PAGE 53** 

## Mission worth waiting for

Program: Impossible Mission

Price: £9.95 (cassette)

Supplier: US Gold, Units 2&3 Holford Way, Holford, Birmingham B6 7AX.

Tel: 021-356 3388

PROFESSOR Elvin Atombender, well known computer genius and psychopath, has hacked into the military computers of the major nations.

Within six hours he will have deciphered the launch codes and started world war three. This is how long you are allocated to penetrate his underground stronghold and find the control centre.

The professor's hideaway is a 32 room complex criss-crossed by a network of lifts and it is in one such lift that your mission begins.

Exits to the left and right can be explored or you can press the down key and the lift will descend to the next level.

Your footsteps echo as you leave the lift and run along the corridors – running off the screen causes the adjoining room to be displayed. This is made up of a series of catwalks, some of which can be accessed using mini lifts.

All the rooms are patrolled by the

professor's robots which are sensitive to movement and armed with high voltage electrodes.

Using the lifts in the correct sequence will help you to avoid most confrontations with the metal menaces. When an encounter is unavoidable you must rely upon your athletic prowess and split second timing to somersault over the approaching robot.

To enter the professor's control room you need a nine digit code, doled out a digit at a time as you complete a series of sub-puzzles.

Puzzle sections are hidden in the furniture to be found in each of the rooms, as are passwords which can be entered into any of the professor's security terminals.

You search the furniture by standing in front of it and pressing the down key. A searching indicator is displayed, and you keep your finger on the key until the bar reaches zero.

At this point you will be told what you've found, but quite often you won't find anything.

All rooms contain at least one security terminal. Accessing this will enable you to immobilise the robots for a while or reset the lifts to their



original position.

The robots only suffer a temporary paralysis so be prepared to take evasive action at the first sign of their reawakening.

To help you solve the sub-puzzles you have been provided with a pocket computer which can be used to manipulate the puzzle pieces that you have collected.

It has taken a few years to get here but the wait has been worthwhile. Impossible Mission is a very good conversion from the Commodore original.

Steve Brook

Sound	6
Graphics	9
Playability	9
Value for money	9
Overall	9

## Licensed to confuse

Program: Operation Safras

Price: £7.95

Supplier: Shards Software, Freepost,

Ilford, Essex IG1 2BR.

Tel: 01-514 4871

IT'S always difficult to follow an outstanding success and with Woodbury End Shards almost made a noose for its own neck – it was that good. Hence I have to admit that I am a little disappointed – perhaps expectedly – with Operation Safras.

"Your name is Rupert James Pettigrew. Your occupation, chartered accountant in the City of London. No particular vices or discernable marks. Single, aged 31, avid stamp collector ... in fact a totally boring individual."

Yet, as many readers will be aware, Pettigrew is of course a secret agent extraordinaire!

You begin the adventure standing by a disused lift and a quick sortie EAST reveals a fiver. Keep this lucky find as it provides a means of bribing information from a tramp later in the game.

Meanwhile, you soon discover a man standing in the shadows, but he's not there to make small talk. Questioning him elicits the response, "You can trust the triplets but beware of the one they call Iron Fist."

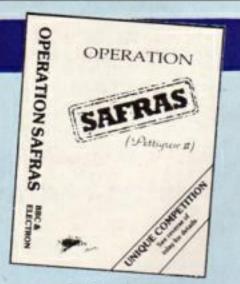
One word of warning – the clues in this adventure are as cryptic as we have come to expect from Steve Maltz, but are totally logical in retrospect.

The aim of the adventure is to rescue five fellow agents who have been secreted in various corners of Great Britain. Then you must use the information gathered to find the Safras sword.

An interesting transport system operates in this adventure, which I hope is expanded upon in future offerings. By pressing T you are presented with a map of this glorious country of ours, and using an unlimited rail ticket you are able to visit such tempting places as Carlisle or even Stockport!

In your travels you pick up various clues and hopefully unravel an intriguing mystery. If you succeed and register your name with Shards you could find that you are immortalised in their next blockbuster adventure.

I must admit that I found the wood in Newport a bit of a puzzle, but as usual X marked the spot. There was also an odd piece of head-banging to



overcome in Dundee!

However, it was pleasant to be reunited with old friends like Annie Gramm again, even if I was more than frustrated on occasions.

The adventure claims to be a sequel to Pettigrew's Diary but bears little similarity to that other Shards classic, either in make-up or plot. Don't get me wrong – I enjoyed Operation Safras as a very professional and at times thrilling adventure. Perhaps I'm really waiting for Return to Woodbury End!

Pendragon

Presentation	8
Atmosphere	
Frustration factor	
Value for money	
Overall	

## **Quality package**

Program: Power Pack Price: £9.95 (cassette)

Supplier: Audiogenic Software, PO Box 88, Reading, Berkshire RG7 4AA.

Tel: 0734 303663

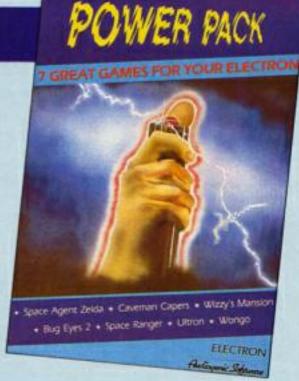
POWER Pack is a compilation of previously released Audiogenic hits with the occasional new game thrown in for good measure – seven games in all, recorded over both sides of two cassettes.

Space Agent Zelda is the heroine of a very classy ladders game. Penetrate the 10 levels of a space ship and destroy its generator before the ship reaches Earth.

Space Ranger is a small screen version of that minor arcade hit Lunar Rescue. Teams of astronauts are stranded at five different sites on the moon – your mission is to fly down through an asteroid storm, landing at each site in turn to rescue the men.

Bug Eyes 2 is one of my all-time favourites and uses the biggest, brightest sprites you've ever seen. Space agent Zelda has been captured by the bug-eyed aliens and incarcerated in the depths of a desolate asteroid: As agent Starman you search for the 25 keys needed to free her.

Caveman Capers follows the exploits of Ogg the caveman as he strives to master a new form of transport — turtle power. Riding an uncooperative turtle you leap over pot



holes, avoid low-flying birds, duck beneath snakes hanging from trees and deduce how to jump the toadstools.

Ultron is a shoot-'em-up space game based loosely on the arcade game Gorf. As pilot of the Ultron space fighter you have to destroy three different waves of aliens before you come face to face with the mothership. Blast that and everything starts again but this time things are a little more hectic.

Wizzy is the tale of woe of a second rate wizard whose attic has been occupied by an unfriendly monster. The pages of his spell book are scattered throughout his mansion's 50 rooms, and without putting them together he can't cast a spell to banish his unwelcome guest. The graphics

have received very little thought and the game soon becomes tedious.

Wongo is the bomb disposal expert assigned to defuse terrorist bombs that have been planted along the great wall of China. The game is a crude Hunchback clone in which you leap over cannon balls and avoid low flying arrows while trying to render the bombs harmless.

With the exception of the last two titles all the software is of high quality and the package is excellent value for money.

Carol Barrow

Sound	8
Graphics	8
Playability	9
Value for money	9
Overall	8

## Memory galore with disc DFS

Product: Electron E00 DFS
Price: £19.99 (3.5in disc)
Supplier: ACP, 6 Ava House, High
Street, Chobham, Surrey GU24 8LZ.
Tel: 0276 76545

WAY back in the February 1986 issue of *Electron User* I reviewed Advanced Computer Products' 1770 DFS. This is a rom which provides Plus 3 owners with a DFS compatible with that used in the BBC Micro.

Both the BBC B+ and Master use 1770 DFS's and these are also designed to be compatible with the old 8271 DFS in the original BBC model B.

With ACP's 1770 DFS Electron users have the ability to access BBC B, B+ and Master discs, which greatly increases the amount of software available to them. In fact the only stumbling block is that the Plus 3 uses 3.5in discs whereas 5.25 is the standard on the

BBC Micro. Still, you can always add a 5.25in second drive.

Now the same DFS is available on disc for Electron owners with ACP's sideways ram cartridge. Simply insert the cartridge in one of the Plus 1's sockets, boot up the disc and you've got a 1770 DFS.

If you want to know what ACP's DFS is like take a look at the February issue – the disc version is identical except that it runs in sideways ram and not rom.

So what are the advantages of having the rom on disc? After all it ties up the sideways ram preventing it from being used for anything else.

The advantage of the disc DFS is that it disables the ADFS and resets PAGE to &E00. This is the same as on an unexpanded Electron.

Compare this to &1D00 with just ADFS, &1900 with DFS and &1F00 with both ADFS and DFS. With ADFS

you lose nearly 4k of memory whereas with ACP's E00 DFS you don't lose any.

It avoids memory problems with long programs and the hassle of downloading software.

Programs which need PAGE to be at &E00 can still access the disc as normal. Downloaded software cannot do this and must select the tape filing system.

After \*FX200,2 and Control+Break the ADFS is restored, PAGE reset to what it was originally and you've got both ADFS and DFS.

ADFS can be selected with \*ADFS and DFS with \*DISC. This enables you to transfer your files to DFS discs. Simply select ADFS, load the file, select DFS and save it.

I thought the 1770 DFS was superb but the E00 DFS is even better! I can recommend it to all Plus 3 owners.

Roland Waddilove

## **Over from Channel 4**

Program: Treasure Hunt

Price: £9.95

Supplier: Macsen, 17 Nott Square, Carmarthen, Dyfed SA31 1PQ.

Tel: 0267 232508

MACSEN is a past master at converting successful TV programs for computers and in this case the target is the popular Channel 4 game show Treasure Hunt. The game comes with four sets of data covering South Devon, London, Anglesey and East Scotland.

The basic idea is simple. You are given a cryptic clue of the sort you might find in a crossword. This gives you the name of your next location and you must fly your helicopter there and collect another clue. This continues until you have solved all the problems.

For example, your first clue might be "Fly to an occidental bad actor or pig meat", which means a location in East London renowned for its bubbly football team.

When you arrive there you have to walk to "The beheaded Queen's field where Alf Garnet likes to go". Some of the clues have a third section to make them even harder.

You are not on your own in this

treasure hunt. Macsen has supplied you with a guide book for the three areas away from London and a map of the metropolis.

You'll need the guide book because a detailed knowledge of the local geography is required. The London map is nearly useless and I used one with a larger scale and much more information.

The only section I have completed is the one covering the London area and this required a quick peek into the computer memory to solve one clue which had me beaten.

In all there are 10 clues to find and to win you must find them in 30 minutes. Most of the time you will spend flying the helicopter, which takes an age to fly from place to place. You will need to be pretty slick with your typing to complete the task in the set time.

If you can't solve a clue you've had it. There is no help so all you can do is fly aimlessly until your time is up. If you can solve all 10 clues you get a final screen which is hardly worth looking at.

You can choose to have a tune playing during the game but I would hardly describe the collection of discordant squeaks as musical.

I actually quite enjoyed the game.



The map of the area you are working on is neatly drawn, and the puzzles were difficult to solve but not impossible. The program is crammed with geographical data and you can end up with a crowded map, full of places which you don't need to complete the task but which do add interest.

Without this extra geography, the clues could be written on a small piece of paper and I feel this is one of those occasions where the computer adds little to the idea.

However, if you get hooked, Macsen offers extra data tapes, with new treasures to hunt, for £5.95.

**Rog Frost** 

Sound	0
	7
Playability	
Value for money	
Overall	

## Gallons of gore

Program: The Ferryman Awaits

Price: £4.95

Supplier: Kansas City Systems, Unit 3, Sutton Springs Wood, Chesterfield.

Tel: 0246 850357

I MUST start by stating that I have not been greatly impressed by Kansas City's previous offerings, though they were better than a lot of the trivia posing as adventures which can be bought today.

However, The Ferryman Awaits is a marked improvement which will keep many of you up until the early hours of the morning trying to fathom out who, why, what or how.

Kansas boasts that this adventure contains about 60k of text – some of which admittedly is used in the introductory passage – and room descriptions are evocative if rather macabre.

Instructions are given in simple sentences, usually no longer than five words – certainly a welcome improvement on Ring of Time.

The adventure is one of the most gory I have come across and as such

should give immense pleasure to horror buffs.

It is also riddled with dry humour – try this offering: "You play Mold, son of Mold, grandson of Mold. Your previous job was that of Dung Heaper for the City of Furgle. One of the perks of the job was permission to sleep near the warmth of the dung pits! Your present employment is part-time human sacrifice!"

Unfortunately the adventure is also riddled with spelling mistakes – I noticed unfortunatly and hidiosly on the first couple of screens. This is becoming all too common with recent releases.

Some of the problems are rather obscure and complicated, chiefly because the game has such a small vocabulary that you can do little except GET and DROP objects. It's a good idea to keep your eyes peeled for any hint that may lurk in the room descriptions.

Good imagery is created by more than six screens of introduction, which set out your task for you in black and white.

It seems you are doomed to wander

the wasteland of Juh which appears to be wholly peopled by demons, pirates, devil worshippers and deformed creatures.

You are apparently filling the role of hero-adventurer after you made frantic attempts to leave your last employment (I can't for the life of me understand why).

As the adventure opens, you find yourself lying across a stone table waiting to be sacrificed by a crazed priest. You are "magically paralysed from the neck down" and your only salvation is to utter the immortal word: Nimlax.

If you enjoy a plethora of blood and guts and can tolerate the "Righty oh, matey" response to almost all you do then this adventure is for you. Otherwise I suggest you try Database's Magic Sword!

Pendragon

Presentation	5
Atmosphere	8
Frustration factor.	
Value for money	
Overall	

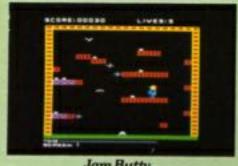
## More great Electron games

This month we introduce a new volume in our Ten of the Best series - 10 more games to give you many hours of fun and entertainment.

These three packages are crammed with the best games from the last 18 months of Electron User. As an added bonus a previously unpublished game has been added to each one - stunning machine code masterpieces from our technical wizard, Roland Waddilove.

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Volume 1

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invisible maze, racing against time.

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Alphaswap: Your letters are in a twist. Can you put them in order?

Knockout: Fast and furious action as you batter down a brick wall.

Money Maze: Avoid ghosts and collect coins

in an all-action arcade classic. Lunar Lander: The traditional computer game specially written for the Electron.



Atom Smash

Atom Smash: Machine code thrills as you help to save the world from destruction. Bunny Blitz: Go egg collecting, but keep away from the proliferating rabbits.

Castles of Sand: Build castles – but beware

the rising tide and hungry sandworms.

Reaction Timer: Test your reactions with

this traffic lights simulation.

Solitaire: The Electron version of the age-old game of logic and patience.

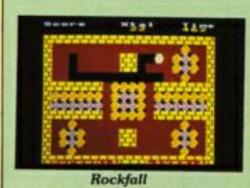
Jumper: Jump for your life in this exciting arcade action game.

Break free: Test your wits and reflexes in this popular classic ball game.

Code Breaker: Crack the code in a colourful if frustrating brainteaser.

Parachute: Save the plunging sky divers from a watery end.

Star Fighter: Attack the bandit ships in this fast-moving 3D punch-up.



Rockfall: Come diamond mining in this fun packed game with its own screen designer. Karate Warrior: Win your black belt in this gruelling test of karate skill.

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Invasion Force: Can you survive wave after wave of relentlessly advancing aliens?

Grebit: Guide the frog across the busy road then across the fast-flowing river!

Fruit Worm: Steer the worm towards the fruit while avoiding rocks and its ever-growing tail. Manic Mole: Watch out for melting platforms and conveyor belts in your quest for jewels. Skramble: Fly your fighter fast and low over the landscape to penetrate enemy territory.

Mr Freeze: You'll need speed and strategy to reach the ice blocks before they melt away. Paint Roller: Steer a speeding roller, run over paint pots but keep clear of the rocks.

# ELECTRON KEYBC ARE

PLOYER BISHOP



HERE is a utility that enables you to use your Electron as an electronic organ. The screen displays a large piano keyboard, a list of commands, the current mode - play, record or playback - the amount of memory free and the tempo.

An arrow at the bottom of the screen points to the note to be played and can be moved left and right using Z and X or player one analogue joystick left and right.

To play the note press Return and hold down S as well if you want it sharp, or F for flat. With joystick move up for sharp, down for flat and press fire to play the note.

Several additional commands are only available from the keyboard. Press P to enter play mode. You can move up and down the keyboard and play any of the notes.

Press R for record mode. Now anything you play will be recorded. There is room for 250 notes and the amount of memory left is constantly updated on screen.

Only the pitch of the notes is recorded, so you can pick out the tune at your own speed and play it back at the correct tempo.

Pauses can be included by pressing V. You'll need these if you want to play several notes of the same pitch, like the first two bars of Jingle Bells.

If you play a wrong note press Delete and a high pitched beep will tell you that the last note has been erased from memory. Press C to clear the whole tune from memory.

Use < and > to set the tempo and press B for automatic playback. A tempo of 10 is a note length of half a second, 20 is one second, 30 is one and a half seconds and so on.

You can press Escape at any time to stop the tune. It does not erase the tune memory.

An alternative way of playing back a recorded tune is selected by pressing K. Now the notes are played as you tap the spacebar so you can concentrate on your timing and rhythm.

Finally, Table I shows a summary of all the keys.

Description	Keyboard	Joystick
Arrow left Arrow right Sharp Flat Sound note Delete note Play mode Record mode Clear memory Auto playback Key playback Pause Tempo up Tempo down	Z X S F Return Delete P R C B K V	left right up down Fire Delete P R C B K V

## Table I: A summary of all the commands

#### VARIABLES

joy Flag for joystick.
Number of notes used so far.
TRUE if note is a sharp.
TRUE if note is a flat.
Note in memory.
RR Tempo.

REC TRUE if recording.

SO Current note being played.

TRUE if note being sounded.

A,B Position of arrow.

### PROCEDURES

key Draws the test Tests to:
play Sounds to playtune Plays bac clear Clears to

pt

Deletes arrow from screen. Draws the keyboard.

Tests to see what keys are being used. Sounds the selected note.

Plays back a recorded tune. Clears the tune.

Changes the tempo.

#### Keyboard Player listing

18 REM Keyboard Player 9,6

20 REM By Oliver Bishop

30 REM And

48 REM Julian Bishop

50 REM Philip Jefferies

68 REM Jonathan Price

78 MODE4: PROCtitle

88 ON ERROR IF ERR=17 60

TO 430 ELSE MODE 6: REPORT: P RINT" at line ": ERL: END

98 IF AS="J" THEN JOY=TR

UE ELSE joy=FALSE

100 TT=0

118 000=8

128 SH=FALSE: FL=FALSE

138 DIM n(255):RR=18

148 REC=FALSE

158 so=52

160 T=FALSE

170 MODE 4: VDU23, 1,0;8;8;

8;

188 PROCpt

198 MOVES,988: DRAW 688,98 8: DRAW 688,1888: DRAW 8,1888 : DRAW 8,988

280 MOVED, 984: DRAW 596, 98 4: DRAW 596, 996: DRAW 4, 996: D RAW 4, 984

218 MOVE 0,888:DRAW 688,8 88:DRAW 688,488

228 MOVE 8,876: DRAW596,87 6: DRAW 596,488

238 MOVE 0,488:DRAW 0,888 :MOVE 4,480:DRAW 4,888

248 MOVE8,484: DRAW 1279,4 84: MOVE 8,488: DRAW 1279,488

258 MOVE 688.688: DRAW 127

9,600: DRAW 1279,400

268 MOVE 688,684: DRAW 127

4,684: DRAW 1274,488

270 VDU 4

288 PRINTTAB(22,3); "COMPU TER"

290 PRINTTAB(22,5); "KEYBO ARD"

380 PRINTTAB(22,7); "PLAYE

310 IF joy=TRUE PRINTTAB( 22,10); "Joysticks" ELSE PRI NTTAB(22,10); "Keyboard"

328 VDU 5

330 VDU4: IF REC=TRUE THEN PRINTTAB(2,2); "RECORD MODE " ELSE PRINTTAB(2,2); "PLA

Y MODE

348 RESTORE 1448:FOR A=5 TO 18:READ A\$:PRINTTAB(1,A) :A\$

350 NEXT

368 PROCnotes

378 PROCkey

700 A-05 D-

388 A=25:B=68

390 MOVE 8,0: DRAW 1279,0

400 VDU23,224,24,60,126,2

55, 255, 24, 24, 24

418 VDU 5: Q=75

428 MOVE25,68:PRINTCHR\$(2

24)

438 REPEAT

440 SH=FALSE: FL=FALSE

450 IF joy=TRUE AND ADVAL (1)/256=255 THEN PROCElank:

A=A-Q:60TO 550

460 IF joy=FALSE AND INKE

Y(-98) THEN PROCESIANK: A=A-Q: 60TO 558

470 IF joy=TRUE AND ADVAL (1)/256=0 THEN PROCEDIANK: A= A+0:60TO 550

480 IF joy=FALSE AND INKE Y(-67) THEN PROCEDIANK: A=A+D :60TO 558

498 IF joy=TRUE AND ADVAL (2)/256=255 THEN SH=TRUE

500 IF joy=FALSE AND INKE Y(-82) THEN SH=TRUE

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## MicroLink

510 IF joy=TRUE AND ADVAL (2)/256=0 THEN FL=TRUE

520 IF joy=FALSE AND INKE Y(-68) THEN FL=TRUE

530 PROCtest: IF T=TRUE TH EN PROCplay: T=FALSE

548 UNTIL 8

550 IF A(0 THEN A=1225

568 IF A>1279 THEN A=25

570 MOVE A.B: VDU 224

SOO ODOC+--+-IF T-TOUR

580 PROCtest: IF T=TRUE TH EN PROCplay: T=FALSE

590 UNTIL 0

600 :

610 DEF PROChlank

628 GCOL 8,8

638 MOVE A.B: VDU 224

648 GCOL 8,3

650 ENDPROC

660 :

678 DEF PROCKEY

688 MOVE 0,90: MOVE 1279,8 0:PLOT 85,0,400:PLOT85,1279

,488

698 GCOL 8.8

700 DIMT (48)

718 QW=8

720 RESTORE 1300

738 FOR A=8 TO 1279 STEP 75

748 IF A=158 OR A=375 OR A=675 OR A=988 OR A=1288 TH EN BOTO 768

758 PROChkey (A)

760 READA\$: VDU5: MOVE A+25

,130:PRINTAS

778 T(QW)=A

780 QW=QW+1

798 MOVE A.88: DRAW A.488

888 MOVE A+4,88: DRAW A+4,

400

818 PLOT69, A-4, 88: PLOT 69 , A, 88: PLOT 69, A+6, 88

820 NEXT A

838 BCOF 8'3

848 ENDPROC

850 :

860 DEF PROCnote

870 FOR S=8 TO 18

880 IF A>T(S) AND ACT(S+1

) THEN so=N(S)

890 NEXT S

900 ENDPROC

February 1987 ELECTRON USER 19

#### Keyboard Player listing

#### From Page 19

910 DEFPROCaptes

920 RESTORE 990 930 DIMN(20) 940 FOR SS=0 TO 18 950 READ S 960 N(SS)=S 970 NEXTSS 980 ENDPROC 990 DATA 40,48,52,68,68,7 2,90,88,96,100,108,116,120, 128, 136, 144, 148, 156, 164 1000 DEF PROCtest 1010 IF joy=TRUE THEN tes= ADVAL(0) AND 3 ELSE tes=0 1020 IF tes=1 THEN T=TRUE 1830 IF tes=3 THEN T=TRUE 1848 IF JOY=FALSE AND INKE Y(-74) THEN T=TRUE 1050 IF INKEY-52 REC=TRUE 1868 IF INKEY (-188) AND RE C=TRUE n(TT)=999:TT=TT+1:VD U4: IF REC=TRUE PRINTTAB(28. 15): "Memory Free: ": 258-TT: ": SOUND 1,-15,0,1 1878 IF INKEY-56 REC=FALSE 1080 IF INKEY (-71) THEN PR OConekey 1898 IF INKEY (-181) THEN P ROCplaytune 1100 IF INKEY (-93) THEN PR OCclear 1110 IF INKEY (-90) THEN VD U4: TT=TT-1: PRINTTAB (20.15): "Mesory Free: "250-TT: SOUND 1,-15,200,2: VDU 5: IF TT(0 T HEN TT=0: SOUND1,-15,20,2 1120 IF TT(1 THEN TT=1 1130 IF INKEY (-184) THEN R R=RR+1: PROCot 1140 IF INKEY (-103) THEN R R=RR-1:PROCpt 1150 VDU4: IF REC=TRUE THEN PRINTTAB(2,2): "RECORD MODE " ELSE PRINTTAB(2,2); "PLA " : VDU5 A WODE 1160 VDU5 1170 ENDPROC 1180 DEF PROColay 1198 VDU4: IF REC=TRUE THEN PRINTTAB(2,2); "RECORD MODE " ELSE PRINTTAB(2,2); "PLAY MODE 1200 VDU4: IF REC=TRUE THEN PRINTTAB(20,15); "Memory Fr ee: ";258-TT;" " 1210 IF TT=250 THEN REC=FA LSE 1220 VDU5

#### PLAY MODE

P...Play
R...Record
C...Record
C...Key Playback
E...Auto Playback
C...Clear Memory
DEL.Delete note
U...Pause

If you use keys: Z=left X=Right S=Sharp F=Flat RETURN=Play COMPUTER KEYBOARD PLAYER..

Keyboard

Memory Free: 250

Tempo: 18



1478 DATA "C...Clear Memor

1238 PROCnote 1248 IF FL=TRUE so=so-4 1258 IF SH=TRUE so=so+4 1268 SOUND&0011,-15.so.18 1270 SH=FALSE:FL=FALSE 1288 IF REC=TRUE n(TT)=so: TT=TT+1: IF TT=250 REC=FALSE 1290 ENDPROC 1300 DATA A.B.C.D.E.F.G.A. B.C.D.E.F.S.A.B.C.D.E 1318 : 1320 DEF PROCplaytune 1330 VDU 4: PRINTTAB(2,2):" PLAYBACK MODE ": VDU 5 1340 FOR AP=0 TO 251 1350 IF n(AP) = 0 GOTO1380 136@ IF n(AP)=999 THEN SOU ND1.0.0,1:60TO 1380 1378 SOUND1,-15,n(AP),RR 1380 NEXT AP 1398 VDU 4: PRINTTAB(2,2):" ": VDU 5 1400 REM (14 Spaces) 1418 VDU4: IF REC=TRUE THEN PRINTTAB(2,2); "RECORD MODE " ELSE PRINTTAB(2,2); "PLAY MODE 1428 VDU 5 1438 ENDPROC 1448 DATA "P...Play", "R... Record\* 1450 DATA "().. Alter Tempo ". "K... Key Playback"

1460 DATA "B... Auto Playba

ck"

v", "DEL. Delete note" 1480 DATA "V... Pause"." " " "."If you use keys: "." Z=1 X=Right", "S=Sharp F=Flat"." RETURN=Play" 1498 DEF PROCelear 1500 FOR D=0 TO 250 1510 n(D)=0 1520 NEXT D 1538 TT=8 1540 VDU 4 1550 PRINTTAB(20,15); "Meao ry Free: ":250-TT:" 1560 VDU 5 1578 ENDPROC 1588 DEF PROCOT 1598 IF RR(8 RR=8:ENDPROC 1600 IF RR)30 RR=30: ENDPRO 0 1610 VDU4 1620 PRINTTAB(20,17): "Temp o: ":RR:" 1630 VDU 5 1640 ENDPROC 1650 : 1660 DEF PROCERy (T) 1670 VDU 29,T:400; 1680 GCOL 0.0 1590 MOVE -20.0: MOVE 20.0: PLOT 85,-28,-200:PLOT 85,20 .-200 1780 SCOL 8.3:PLOT69,-28,-200: PLOT69, 20, -200: GCOL 0,0 1710 VDU 29,0;0;

1720 ENDPROC 1730 DEF PROCtitle 1748 CLS 1750 PRINT "Computer Key board Player" 1760 PRINT "BY OLIVER BISH 1778 PRINT' With help from Julian, Philip & Jonathan" 1780 PRINT "You can use K eyboard ( K )\* 1790 PRINT'"Or Analogue jo ystick ( J )" 1800 PRINT "Which?";: A\$=GE T\$ 1818 ENDPROC 1828 DEFPROConekey 1830 VDU 4:PRINTTAB(2,2);" ONE KEY PLAY ": VDUS 1848 FOR AP=8 TO 251 1858 IF n(AP)=QQQ 60T01918 1868 IF n(AP)=999 60T01910 1878 IF n (AP) = 8 THEN SOTO 1918 1880 +FX15.1 1898 REPEAT UNTIL BET=32: # FX21.5 1900 REPEAT: SOUND1,-15,n(A P).1:UNTIL INKEY(-99)=FALSE 1918 000=n (AP):NEXT 1920 ENDPROC

This listing is included in this month's cassette tape offer. See order form on Page 53.



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# The state of the s

WE all know that the graphic capabilities of the Electron are superb. In this program these facilities are used to produce square patterns which end up looking like fireside rugs.

These effects are produced by moving into undocumented areas of Basic. The Electron User Guide lists GCOL 0 to GCOL 4, but it would be beyond the Acorn boffins to leave it at that.

In fact there are 256 different versions of GCOL, most of which produce vertical stripes.

These stripes are added on to the existing colours in numerous different ways and intricate patterns can be created.

In Carpet the computer is the main artist but you make some decisions. Firstly you can select any graphics mode and then choose the colours.

After that the Electron is away, but you can stop it at any time and invert all the colours before giving the computer its head again. The program contains full instructions.

MAIN VARIABLES

C% D%() M% R% Used to select colour and GCOL.
Number of colours available.
Actual colours chosen.
Mode selected.
Size of current square.

18 REM Carpet

28 REM By Rog Frost

38 REM (c) Electron User

40 ON ERROR IF ERR(>17 M ODE6:REPORT:PRINT\* at line

":ERL:END

50 CLEAR

68 MODE6: VDU19,8,4:8;23;

8202;0;0;0;

78 PROCinstruct

80 PROCselect

98 MODEMX: VDU23;8202;0;0

:8:

100 FORNX=ITOCX: VDU19,NX,

DI(NI):8::NEXT

118 IF MX=2 FORNX=8T015:V

DU19,NX,DX(NX-8);8;:NEXT

128 CLS

138 VDU29,638;508;

140 REPEAT: 0%=RND(127)

150 RX=518

168 MOVER, 8

170 FORAX=1T0127STEP2

188 GCOLAX+QX, AXDIV2

198 MOVE8,RX:MOVE8,8:PLOT 85,RX,8:PLOT85,8,-RX:MOVE8,

0:PLOT85,-RI,0:PLOT85,0,RI

200 IF INKEY (-99) PROCpaus

218 RX=RX-8

228 NEXT

230 UNTIL 1=2

248 DEFPROCpause

250 REPEAT

268 IF INKEY (-74) GCOL4,1

28: CL6

278 UNTILINKEY (-1)

288 ENDPROC

290 DEFPROCinstruct

300 VDU28,1,24,39,0

318 PRINTTAB(13,2) °C A R
P E T"TAB(13,3)

320 PRINT" "This program will design a carpet" "in t wo, four or eight colours."

330 PRINT'"At any time y ou can hit space to"'"stop the drawing."

340 PRINT" "Return then i nverts all colours."

350 PRINT' "Press shift to restart the action."

360 REPEAT: INPUT' "Which Mode (8,1,2,4,5)", MX:UNTILM %)-1 AND MX(6:IF MX=3 THEN3 60

370 CLS

388 ENDPROC

390 DEFPROCselect

488 PRINT "Colours are:-

418 PRINT"8...black""1.

..red"'"2...green"'"3...yel low"'"4...blue"'"5...magent a"'"6...cyan"'"7...white"

428 FORNX=8TOMX: READCX: NE

438 DATA2,4,8,8,2,4

448 DIM DZ (CZ)

450 PRINT'"You have chose n MODE ";MX;" and can"'"sel ect ";CX;" colours."

460 VDU28,1,24,39,18

478 FORNX=1TOCX:PRINT'"Se lect number for colour ";NX :IF NX=CXPRINT" (BACKGROUND )";

480 INPUT DX (NX): NEXT

498 ENDPROC

This listing is included in this month's cassette tape offer. See order form on Page 53.



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ODD MAN OUT

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**TO ORDER TURN TO THE FORM ON PAGE 53** 

LAST month I left you with a mandala to muck about with and reinforce what you've learnt about coordinates and the graphics commands DRAW and MOVE.

Now we'll look at another graphics command, one that allows you to draw without a DRAW.

First put the Electron into a four colour mode with:

#### MODE 1

And now draw a line to (roughly) the centre of the screen with:

#### DRAW 500,500

By now you should be thoroughly familiar with the idea that the DRAW command moves the invisible graphics cursor from wherever it was to the point whose coordinates follow the DRAW. On the way the graphics cursor draws a line.

Since we'd just entered Mode 1, the cursor was at the bottom left of the screen, the origin. This has coordinates 0,0. After the:

#### DRAW 500,500

the cursor is now at the point 500,500 and any subsequent DRAWs will The PLOT: Draw without DRAWing!

Part 12 of the Electron graphics series by TREVOR ROBERTS

take this as the start of the line.

Now let's go back to the original conditions and draw the same line. Only this time we won't be using DRAW.

Again, put the micro back into Mode 1 with:

#### MODE 1

and we're back where we started. The screen is clear and the cursor is positioned at 0,0. Try:

PLOT 5,500,500

and see what happens. The result is exactly the same as with:

#### DRAW 500,500

So what is this PLOT all about?

In essence, it is a Basic command which controls what can be drawn on the graphics screen and how it is drawn.

As we'll see, it can do all sorts of interesting things, one of which is to get the Electron to draw a line.

The format for the PLOT command is:

## PLOT code,xCoordinate,yCoordinate

The xCoordinate and yCoordinate values are just the same as the two coordinate values that we've previously used with MOVE and DRAW.

The code parameter is something else entirely, adding to the PLOT. In fact what the PLOT command actually achieves depends entirely on the value of code.

In our earlier example

code had the value 5. This tells the Electron to draw a line from wherever the graphics cursor is when the command is issued to the point with coordinates xCoordinate, yCoordinate.

Since these are both 500 and the cursor starts off at 0,0 a line is drawn (or plotted) from 0,0 to 500,500.

So PLOT with a code of 5 is exactly the same as DRAW. Try a few PLOT 5s with other coordinate values to convince yourself of this.

Inquiring minds may wonder if there's a PLOT equivalent to MOVE. There is. It's when PLOT has a code of 4.

To demonstrate this, recreate our original line with:

MODE 1 PLOT 5,500,500

or:

MODE 1 DRAW 500,500

if you want to be oldfashioned.

Whichever way you go about it, the graphics cursor is now lurking invisibly at 500,500.

It's probably getting

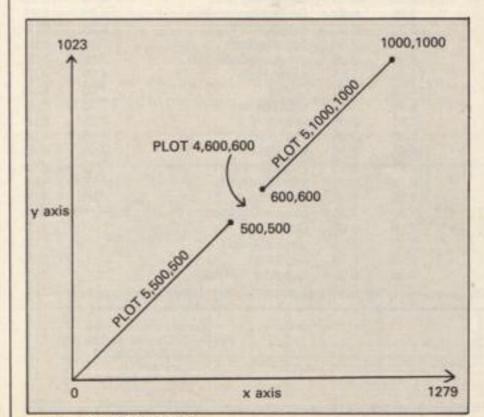


Figure 1: PLOT in action

## Graphics

#### From Page 27

bored so give it something to do with:

PLOT 4,680,688

and you'll see nothing happen. In fact what has happened is that the Electron has obeyed the PLOT 4 and moved the graphics cursor to 600,600 without leaving a line behind it.

We could have used:

MOVE 600,600

to do the same job but as we're trying to unravel the PLOT command it would have been a bit daft!

Mind you, I say that the graphics cursor is at 600,600, but since it's invisible it could be anywhere, couldn't it?

So let's just indicate where it is (or was, after the

command) using:

PLOT 5,1000,1000

which, you will see, draws a line from 600,600 to 1000,1000.

The more pedestrian may use:

DRAW 1000,1000

for the same purpose but be warned. Soon PLOT will be doing things that MOVE and DRAW can't, so you might as well get used to it.

By this time you should

18 REM Program I 28 MODE 1 38 FOR loop=1 TO 28 48 DRAW RND(1888),RND(18

58 MOVE 8,8 68 NEXT 1000

Program I

have a line across the screen with a little gap in it. Figure I shows the PLOTs behind the story so far.

Can you use the PLOT command to fill in the gap? It isn't hard. The answer is:

PLOT 4,580,588 PLOT 5,680,688

or:

PLOT 4,600,600 PLOT 5,500,500

where PLOT 4 is equivalent

18 REM Program II
28 MODE 1
38 FOR loop=1 TO 28
48 PLOT 5,RND(1888),RND(
1888)
58 PLOT 4,8,8
68 NEXT loop

Program II

to MOVE and PLOT 5 equates to DRAW.

Notice that although both the above answers fill in the gap, they're not the same.

There's a subtle but important difference between them. Can you see it?

Well literally, no you can't, as it involves the invisible graphics cursor.

Ask yourself where it ends up after each PLOT 5.

And when you've figured that out, have a look at Programs I and II. Although they use different keywords, they do the same thing, as you'll find when you run them. If you're feeling adventurous, try other values for the code parameter in Program II.

 That's what we'll be doing next month as relatives get involved in the PLOTting.

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# Your ADC likes a bit of electrical peace and quiet

## Part II of the Plus 1 series by JOE PRITCHARD

LAST month we looked at the basic concepts and ideas behind analogue to digital converters. This month we'll look at the Plus 1's analogue port in particular and examine its possibilities and limitations. In addition, we'll see how Basic's ADVAL function is used to read the port.

Figure I shows the analogue socket seen as it appears when looking at the back of the Plus 1.

Such a diagram is often called a pin out because it shows how the "pins" of the Analogue to Digital Converter (ADC) chip in the Plus 1 are taken to the outside world.

The connector used for the analogue input is a 15-pin socket referred to as a D-type, (you only have to look at it to see why) which receives a 15-way D plug.

Now let's look at what each of the pins does. Rather than just go through the pins from 1 to 15, I've grouped them according to their function.

Pin 1 is the +5 volt line which can be used to power things that are plugged into the analogue port.

However, it can't supply much current, so don't do silly things like connecting it to a 0V pin.

For those of you who might be tempted to try, this

would result in a short circuit, the 5V supply being asked to supply a very large current. It can't do this so the Plus 1 could be damaged.

Pins 2 and 3 are the 0 volt lines. This pair, plus the 5 volt line are taken from the digital circuitry inside the Electron and Plus 1.

These two pins are often called the digital ground pins, ground being the term used in electronics to refer to a wire or connection which is at 0V.

Pins 5 and 8 are more 0V lines and are called analogue ground lines.

Why do we have two different sets of 0V pins available? Well, it's all to do with electrical noise.

Just think of noise in electrical circuits as being similar to static on the radio, or the interference that you sometimes get on television when a car goes past.

When logic signals go round a computer circuit they can generate some of this noise in electrical circuits to which they are connected or any circuit that is close by.

The digital ground lines are particularly susceptible to this specific form of noise and although the voltages involved are not big enough to cause any problems to the digital circuits, they can cause difficulties with analogue signals.

The voltage input to an ADC is always via two wires, one of these being a 0V line. The ADC effectively converts the voltage difference between the signal wire (which carries the voltage from the transducer in use) and the 0V line, into a digital output for the computer to read.

Therefore if the line used has a small changing

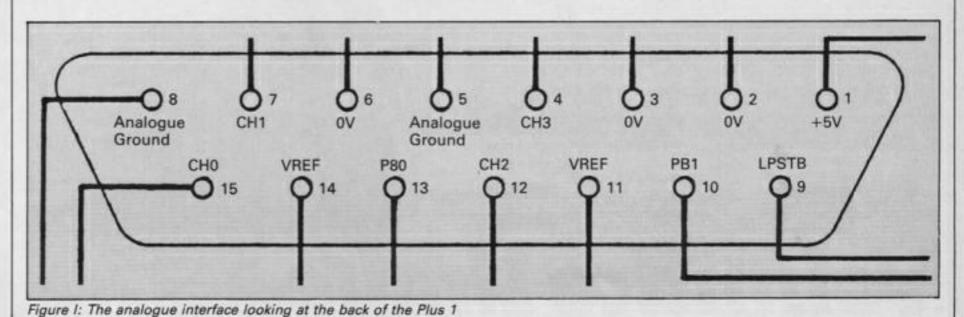
voltage on it the difference between the signal voltage and the 0V line will also change, causing a variation in the digital output.

To reduce these alterations in input voltage to the ADC, the analogue ground is supposed to be electrically quiet with little or no noise on it.

The noise on any ground used gives rise to something called jitter on the output of the ADC – the value returned alters slightly when there is a constant voltage input.

The practical result of all this is that we should always input our signals via the analogue ground if we have the chance.

Pins 11 and 14 carry a voltage of 1.8V. This is intended to be used as a



## **Hardware projects**

#### From Page 29

reference voltage; an input of 1.8V to the analogue interface will cause a maximum value to be output by the ADC.

You shouldn't try powering an electrical circuit from this signal, known as VREF (Voltage REFerence), as it can't supply enough current to be of use.

If you do intend to use it, as we will do later in the series, it should be used to supply voltage to a circuit that has an impedance of at least 10,000 ohms. Such circuits usually take the full VREF and return a fraction of it to an ADC input channel depending on the size of the physical parameter being measured.

Pins 10 and 13 are digital inputs and are typically used to connect the joystick fire buttons to the computer. There'll be more on their use later in the series.

Now let's take a brief look at how Basic reads the analogue port.

The Plus 1 can have 4 input voltages connected to it - channels 0 to 3 - as follows:

> Channel 0 Pin 15 Channel 1 Pin 7 Channel 2 Pin 12 Channel 3 Pin 4

The ADC converts each of these inputs in turn, taking 10mS each. Under normal circumstances therefore, a given channel is converted once every 40mS.

Each channel can be read from software using Basic's ADVAL(n) function where n is the channel number. Just to confuse matters here, Basic sees the channels as being numbered 1 to 4.

When building any hardware project which uses the analogue port always remember:

- Don't connect the inputs to any voltage above 1.8
- Don't connect the inputs to any voltage less than 0
- Never bring mains voltages anywhere near the ADC input.

Failure to observe these conditions may cause damage to the Plus 1.

The first statement is clear enough; the ADC is reputed to be able to take up to 5V input without damage don't risk it though.

There are no advantages in using such high input voltages. For many experiments VREF will provide the

voltages needed.

The second condition needs a little thought. "Less than 0 volts" simply means a negative voltage at the input relative to that on the analogue ground line.

The simplest way to damage your Plus 1 would be to take a battery and connect the positive terminal to OV and the negative to the input pin of one of the channels.

The third statement should be very obvious this would damage the Plus 1, the Electron and you!

 That's it for now. Next month we get to the part you've all been waiting for actually plugging something in to the analogue port. We'll build a couple of circuits so that we can cut our teeth on some simple analogue interfacing.

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#### From Page 33

18 REM ----- Maze -----20 REM By Martin Cottle 38 REM (c) Electron User

48 REM -----

50 ONERROR IF ERR=17 60T 080 ELSE MODE6:PRINT'':REP ORT:PRINT" at line ";ERL:EN

68 DIM MAN\$(2,2),key(16) :H\$="MARTIN":HIX=188

70 MODE6: PROCasab: PROCse tup

88 MODE4: PROCinst

98 MODE5: VDU23; 8282; 8; 8; 8; 19, 3, 6; 8;

100 REPEAT

110 PROCinit

120 PROCscreen: PROCmain

138 PROCend

148 UNTILFALSE

150 DEFPROCeain

160 REPEAT: CALLkeys: a% = A% : b% = 8%: ON?dir GOSUB 250,260 .270,280 ELSEGOTO190

170 ?&78=A%:?&71=B%:CALLC heck:IF?scr=32 THEN 180 ELS E IF?scr=128 PROCcollect EL SE IF?scr=0 THEN PROCeb ELS E IF?scr=129 ?medead%=1

180 ?&70=AX:?&71=BX+1:CAL Lcheck:IF?scr=32 THEN 190 E LSE IF?scr=120 PROCcollect ELSE IF?scr=0 THEN PROCmb E LSE IF?scr=129 ?medeadX=1

198 PROCnewscreen: COLOUR1 :PRINTTAB(aX,bX); SP\$: TAB(AX,BX); MAN\$(dX,pX);: CALLalien s:?randomX=RND(4):?(&928+RN D(15))=RND(4):IF?medeadX=1 PROCdead

200 IFINKEY-99 AND ?dir(3 PROCfire

218 UNTILLX=8

220 \*FX21.0

230 ENDPROC

240 DEFPROCab: ON?dir 60SU B 260,250,280,270:?dir=0:EN DPROC

250 AX=AX-1:IFMX=1 dX=2:p X=1:MX=2:RETURN ELSE dX=2:p X=2:MX=1:RETURN

268 AX=AX+1:IFMX=1 dX=1:p X=1:MX=2:RETURN ELSE dX=1:p X=2:MX=1:RETURN 278 BX=BX-1:IFMX=1 pX=1:M X=2:RETURN ELSE pX=2:MX=1:R ETURN

288 BX=BX+1:IFMX=1 pX=1:M X=2:RETURN ELSE pX=2:MX=1:R ETURN

290 DEFPROCcollect: VDU31,
?470,?471,32: keyX=keyX+1: VD
U17,3,31,16,21: PRINT: keyX;
"::FORIX=200T0203: SOUND1,15,IX,1: NEXT: key(roomX) = 0: S
X=SX+10: VDU17,2,31,16,12: PR
INT: SX::ENDPROC

300 DEFPROCfire: IFdX=1 60 TO340

318 IFAX(=2 ENDPROC

320 SOUND1,1,60,5:D%=8%+1
:I%=A%-1:REPEAT:?%78=I%:?%7
1=D%:CALLcheck:IF?scr(>32 P
ROCchscr:I%=2 ELSE VDU31,I%
.D%,130:PROCpause(1):VDU31,
I%,D%,32

338 IX=IX-1:UNTILIX<2:END PROC

340 IFAX>=13 ENDPROC

350 SOUND1,1,60.5:DX=8X+1 :IX=AX+1:REPEAT:?&70=IX:?&7 1=DX:CALLcheck:IF?scr<>32 P ROCchscr:IX=13 ELSE VDU31,I X,DX,130:PROCpause(1):VDU31 ,IX,DX,32

368 IX=IX+1:UNTILIX>13:EN DPROC

370 DEFPROCchscr: IF?scr=1 29 PROCloop

380 IF?scr=128 VDU31,IX,D %,128:ENDPROC ELSE VDU31,IX ,D%,32:ENDPROC

398 DEFPROCIoop: 01=0:REPE AT: IF IX=?(ax1+01) AND D1=? (ay1+01) AND ?(adead1+01)=0 THEN ?(adead1+01)=1:SOUND0 ,-15,6,4:S1=S1+10:COLOUR2:P RINTTAB(16,12);S1:need1=ne ed1-1:VDU31,11,D1,140

488 QX=QX+1:UNTILQX=16:EN DPROC

418 DEFPROCPAUSE(p):TIME= 8:REPEATUNTILTIME>p:ENDPROC

420 DEFPROChewscreen:fin% =0:IFroom%=16 PROCchexit:EN DPROC

438 IFneed%=8 AND done%=8
PROCdoors:done%=1 ELSE IFd
one%=8 ENDPROC

448 IFAX>14 room%=room%+1

:AX=2:aX=2:finX=1 ELSE IFAX <2 roomX=roomX-1:AX=13:aX=1 3:finX=1

458 IFBX<2 roomX=roomX-4: BX=26:bX=26:finX=1 ELSE IFB X>27 roomX=roomX+4:BX=5:bX= 5:finX=1

468 IFfin%=1 fin%=0:PROCs creen

478 ENDPROC

480 DEFPROCchexit

498 IFneed%=8 AND done%=8 AND key%(>16 PROCIdoor:don

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e%=1 ELSE IFneed%=8 AND key %=16 AND done%=8 PROCdoors: done%=1

580 IF AX>14 PROCreset:PR OCscreen:ENDPROC ELSE IFAX 2 roomX=roomX-1:AX=13:finX=

518 IFfinX=1 finX=8:PROCs creen

528 ENDPROC

530 DEFPROCreset: VDU28,0, 31,15,0,12,26

540 PROCdh(3,3,"MELL DONE
'",1,2):PROCdh(0,8,"You esc
aped from",3,2):PROCdh(0,12
,"the maze,but can",3,2):PR
OCdh(0,16,"you do it again?
",3,2):PROCdh(0,21,"BONUS:"
,2,1)

558 RESTORE568:FORIX=0TO2 1:READP,D:SOUND1,-15,P,D/2: SOUND1,0,0,0:NEXTIX

560 DATA101,10,109,10,117,10,121,20,101,20,121,10,117,10,121,10,129,20,109,20,109,10,117,10,121,10,137,10,129,10,121,10,121,10,121,10,117,10,101,40

578 PROCpause (200)

580 COLOUR3: PRINTTAB (6,22)
"100": oldSX=SX: REPEAT: SX=S
X+10: PRINTTAB (16,12); SX:: SO
UND1,-15,SXDIV10,2: PRINTTAB
(6,22); 100-(SX-oldSX): "::

PROCpause (25): UNTILS%=old5% +100

598 IFLX(5 LX=LX+1:PRINTT AB(15+LX-1,29);MAN\$(1,2);:S DUND1,1,68,2

688 PROCdh(2,26, "PRESS SP ACE",1,2):PROCdh(2,28, "TO C ONTINUE",1,2)

618 +FX21.8

628 REPEATUNTILGET=32

638 room%=16:?aliens%=?al iens%+2:need%=?aliens%:A%=2 :B%=5:key%=-1:PROCcollect:I F?aliens%>16 ?aliens%=16

648 FORIX=1T016: key(IX)=1 :NEXT: SOUND1,-15,41,2: SOUND 1,-15,69,6: SOUND1,-15,41,2: SOUND1,-15,69,18

658 ENDPROC

660 DEFPROCscreen

678 VDU28,8,31,15,8,12,26 688 GCOL0,3:ON room% GOSU B 730,748,730,750,760,770,7 80,740,790,800,810,770,820, 830,790,840

698 PROCdoors

788 MX=2:COLOUR1:PRINTTAB
(AZ,BX); MAN\$(dX,pX);:PROCal
iens:?dir=8:needX=?aliensX:
doneX=8

718 IFkey(room%)=1 REPEAT :?&78=RND(12)+1:?&71=RND(19 )+6:CALLcheck:UNTIL?scr=32: VDU31,?&78,?&71,128

720 ENDPROC

738 PROC1: PROC2: PROC3: PRO C4: VDU23, 129, 48, 16, 84, 56, 25 4, 56, 84, 8: RETURN

748 PROC5: PROC6: PROC7: PRO C8: VDU23, 129, 36, 24, 68, 98, 15 4, 165, 195, 8: RETURN

750 PROC5: PROC6: PROC9: PRO C10: VDU23, 129, 129, 66, 36, 24, 24, 60, 66, 129: RETURN

768 PROC11: PROC12: PROC3: P ROC8: VDU23, 129, 129, 66, 36, 98 ,189, 98, 255, 153: RETURN

778 PROC11: PROC12: PROC14: PROC18: VDU23, 129, 129, 98,68, 98,126,68,98,129: RETURN

780 PROC11: PROC15: PROC3: P ROC4: VDU23, 129, 126, 255, 219, 255, 102, 60, 102, 195: RETURN

798 PROC11: PROC15: PROC14: PROC17: VDU23, 129, 68, 66, 165, 165, 153, 255, 66, 68: RETURN

888 PROC5: PROC2: PROC7: PRO C4: VDU23, 129, 24, 68, 126, 165, 153, 126, 68, 24: RETURN

818 PROC16: PROC12: PROC7: P ROC8: VDU23, 129, 68, 126, 219, 2 55, 195, 219, 126, 68: RETURN

828 PROC1: PROC2: PROC14: PR OC17: VDU23,129,28,28,62,187 ,62,28,42,73: RETURN

838 PROC16: PROC12: PROC9: P ROC18: VDU23, 129, 68, 66, 165, 1 29, 165, 153, 66, 68: RETURN

848 PROC5: PROC2: PROC9: PRO C17: VDU23, 129, 68, 126, 255, 15 3, 219, 255, 255, 219: RETURN

850 DEFPROC1: MOVE8, 499: DR AWB, 999: DRAW499, 999: MOVE123 ,499: DRAW123, 876: DRAW499, 87 6: MOVEB, 999: DRAW123, 876: END PROC

868 DEFPROC2: MDVE587,999: DRAW1819,999: DRAW1819,593: D RAW896,569: DRAW896,876: DRAW 587,876: MOVE1819,999: DRAW89 6,876: ENDPROC

878 DEFPROC3: MOVE8, 8: DRAW 377, 8: DRAW489, 123: DRAW123, 1 23: DRAW8, 8: DRAW8, 499: MOVE12 3, 123: DRAW123, 499: ENDPROC

888 DEFPROC4: MOVE896,123: DRAW689,123: DRAW641,8: DRAW1 819,8: DRAW1819,425: DRAW896, 449: DRAW896,123: DRAW1819,8: ENDPROC

898 DEFPROC5: MOVE123,876: DRAW123,569: DRAW8,593: DRAW8,999: DRAW123,876: DRAW499,87 6: MOVE499,999: DRAW8,999: END PROC

988 DEFPROC6: MOVE587,999: DRAW1819,999: DRAW1819,499: M OVE896,499: DRAW896,876: DRAW 587,876: MOVE1819,999: DRAW89 6,876: ENDPROC

918 DEFPROC7: MOVE8, 8: DRAW 377, 8: DRAW489, 123: DRAW123, 1 23: DRAW123, 449: DRAW8, 425: DR AW8, 8: DRAW123, 123: ENDPROC

928 DEFPROC8: MOVE896,123: DRAW689,123: DRAW641,8: DRAW1 819,8: DRAW1819,499: MOVE896, 499: DRAW896,123: DRAW1819,8: ENDPROC

938 DEFPROC9: MOVE8, 8: DRAW 8,425: DRAW123,449: DRAW123,1 23: DRAW8,8: DRAW499,8: MOVE12 3,123: DRAW499,123: ENDPROC

948 DEFPROC18: MOVE587,123 :DRAW896,123: DRAW896,499: MO VE587,8: DRAW1819,8: DRAW1819 ,499: MOVE1819,8: DRAW896,123 :ENDPROC

958 DEFPROC11: MOVEB, 499: D RANG, 999: DRAW377, 999: DRAW48 9,876: DRAW123,876: DRAW123,4 99: MOVEB, 999: DRAW123,876: EN DPROC

968 DEFPROC12: MOVE896,876 :DRAW689,876: DRAW641,999: DR AW1819,999: DRAW896,876: DRAW 896,499: MOVE1819,999: DRAW18 19,499: ENDPROC

978 DEFPROC14: MOVE8, 499: D RAW8, 8: DRAW499, 8: MOVE499, 12 3: DRAW123, 123: DRAW123, 499: M OVE8, 8: DRAW123, 123: ENDPROC

988 DEFPROC15: MOVE896,876 :DRAW896,569: DRAW1819,593: D RAW1819,999: DRAW896,876: DRA W689,876: DRAW641,999: DRAW18 19,999: ENDPROC

998 DEFPROC16: MOVE123,876 : DRAW123,569: DRAW8,593: DRAW 896,449: DRAWB96,123: DRAW587 ,123: MOVE1819,8: DRAW896,123 :ENDPROC

1818 DEFPROCIdoor:6COL3,1:
MOVE8,429:DRAW8,589:DRAW123,565:DRAW123,453:DRAW8,429:
MOVE123,481:DRAW8,478:MOVE1
23,589:DRAW8,589:MOVE123,53
7:DRAW8,547:6COL3,2:VDU5:MO
VE48,478:VDU141,4:ENDPROC

1828 DEFPROCrdoor: GCOL3,1: MOVE896,453: DRAW896,565: DRAW1819,589: DRAW1819,429: DRAW896,453: MDVE896,481: DRAW1819,478: MOVE896,589: DRAW1819,589: MOVE896,537: DRAW1819,587: GCOL3,2: VDU5: MOVE938,568: VDU141,4: ENDPROC

1838 DEFPROCudoor:GCOL3,1: MOVE385,999:DRAM633,999:DRA M681,876:DRAW417,876:DRAW38 5,999:MOVE463,876:DRAW439,9 99:MOVE589,876:DRAW589,999: MOVE555,876:DRAW579,999:GCO L3,2:VDU5:MOVE481,932:VDU14 1,4:ENDPROC

1848 DEFPROCEDOOR: 6COL3,1:

GOSUB1078,1080,1070,1090,11 80,1110,1120,1080,1130,1140 ,1150,1110,1160,1170,1138,1

1868 ENDPROC

1878 PROCddoor: PROCrdoor: R ETURN

1888 PROCddoor:PROCIdoor:R ETURN

1898 PROCIdoor: RETURN

1100 PROCudoor: PROCEdoor: R ETURN

1118 PROCudoar: RETURN

1120 PROCudoor: PROCddoor: P ROCrdoor: RETURN

1138 PROCudoor: PROCrdoor: R

1140 PROCEDOOR: PROCEEDOR: P ROCEDOOR: RETURN

1150 PROCudoor:PROCddoor:P ROCldoor:RETURN

1160 PROCrdoor: RETURN

1178 PROCudoor: PROCIdoor: R ETURN

1188 PROCIdoor:PROCrdoor:R ETURN

1198 DEFPROCdead:COLOUR3:P RINTTAB(AX,BX);DEAD\$::FORIX =1T025:VDU19,0,1;8;:SOUND0, -15,4,1:VDU19,0,8;8;:NEXT:P RINTTAB(AX,BX);SP\$:

1200 LX=LX-1:PRINTTAB(15+L X,29);SP\$;:AX=2:BX=5:PROCsc reen:?medeadX=0:ENDPROC

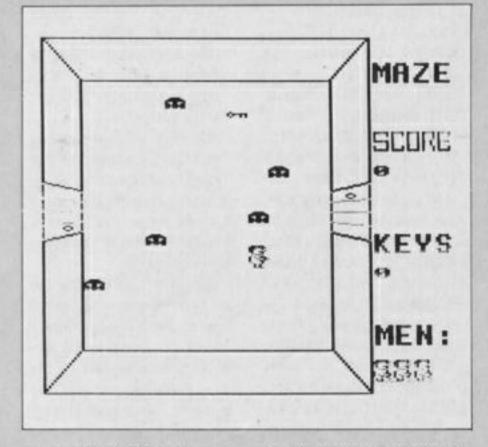
1218 DEFPROCInit

1220 ?scr=0:?dir=0:?aliens %=5:?medead%=0

1238 PROCdh (16,3,"MAZE",2, 3):PROCdh (16,9,CHR\$131+CHR\$ 132+CHR\$133+CHR\$134,1,2):PR INTTAB(16,12);"8";:PROCdh (1 6,18,"KEYS",2,1):PRINTTAB(1 6,21)"8";:PROCdh (16,26,"MEN :",2,3)

1248 FORIX=16T019:COLOUR1: PRINTTAB(IX,29);MAN\$(1,2);: NEXT

1260 SOUND1,-15,41,2:SOUND 1,-15,69,6:SOUND1,-15,41,2: SOUND1,-15,69,10



8,999: DRAW377,999: DRAW489,8 76: DRAW123,876: DRAW8,999: EN DPROC

1000 DEFPROC17: MOVE507, 0: D RAW1019, 0: DRAW1019, 425: DRAW MOVE305, 0: DRAW417, 123: DRAW6 81,123: DRAM633,8: DRAM385,8: MOVE463,123: DRAM439,8: MOVE5 89,123: DRAM589,8: MOVE555,12 3: DRAM579,8: GCOL3,2: VDU5: MO VE561,88: VDU141,4: ENDPROC 1858 DEFPROCHOOFS: ONFOORX

#### From Page 35

1270 ENDPROC 1280 DEFPROCsetup 1298 ENVELOPE1,129,-15,-8, -3,18,18,10,126,8,8,-126,12 6,126 1388 VDU23,128,8,8,64,191, 165,69,0,0 1318 VDU23,129,129,98,68,9 0,126,60,98,129 1328 VDU23,138,24,24,0,0,8 ,0,0,0 1330 VDU23,131,126,66,64,1 26,2,66,126,0 1340 VDU23,132,251,138,130 ,130,130,138,251,0 1350 VDU23, 133, 239, 40, 40, 4 7,41,48,232,8 1360 VDU23,134,198,162,160 .62,32,162,190,0 1378 VDU23, 135, 56, 124, 84, 8 4,124,48,48,56,23,136,146,1 98,188,48,24,188,198,138:DE AD\$=CHR\$135+CHR\$8+CHR\$10+CH R\$136 1380 VDU23,140,137,86,33,2 02,37,72,145,37 1390 VDU23,141,0,0,24,36,3 6,24,0,8

1408 VDU23,151,124,254,228 ,194,204,68,56,68,23,152,17 4,147,142,132,68,40,40,60:M AN\$(1,1)=CHR\$151+CHR\$8+CHR\$ 18+CHR\$152

1410 VDU23,153,132,142,163 ,158,132,82,120,247:MAN\$(1, 2)=CHR\$151+CHR\$8+CHR\$10+CHR \$153

1420 VDU23,154,62,127,35,6
7,51,34,28,34,23,155,117,20
1,113,33,34,20,20,60:MAN\$(2,1)=CHR\$154+CHR\$8+CHR\$10+CH
R\$155

1430 VDU23,156,33,113,197, 121,33,74,85,239:MAN\$(2,2)= CHR\$154+CHR\$8+CHR\$10+CHR\$15

1448 SP\$=CHR\$32+CHR\$8+CHR\$ 18+CHR\$32

1450 ENDPROC

1468 DEFPROCaseb:scr=&72:d ir=&73:aliens%=&74:xstore%= &75:col1%=&76:col2%=&77:med ead%=&78:random%=&79:ax%=&9 88:ay%=&918:adir%=&928:adea d%=4930: os=4FFEE

1478 FORpass=8T02STEP2:P%= %5288

1488 [OPToass

1490 .dh STA&88:STX&89:STY &8A:LDA@10:LDX@&88:LDY@8:JS R&FFF1

1588 LDA#23:JSRos:LDA#255:
JSRos:LDA#81:JSRos:JSRos:LD
A#82:JSRos:JSRos:LDA#83:JSR
os:JSRos:LDA#84:JSRos:JSRos
:LDA#17:JSRos:LDACol1%:JSRo
s:LDA#31:JSRos:LDA#89:JSRos
:LDA#8A:JSRos:LDA#255:JSRos
1518 LDA#23:JSRos:LDA#255:
JSRos:LDA#85:JSRos:JSRos:LD
A#86:JSRos:JSRos:LDA#87:JSR
os:JSRos:LDA#88:JSRos:JSRos
:LDA#17:JSRos:LDA#89:JSRos
:LDA#17:JSRos:LDA#89:JSRos
:LDA#8A:ADC#1:JSRos:LDA#255
:JSRos:RTS

1528 .inkey LDY#&FF:LDA#&B 1:JSR&FFF4:TXA:RTS

1530 .keys LDX4&9E:JSRinke y:BEQnleft:LDA#1:STAdir

1548 .nleft LDX#&BD:JSRink ey:BEQnright:LDA#2:STAdir

1558 .nright LDX#&B7:JSRin key:BE@nup:LDA#3:STAdir

1568 .nup LDX#&97:JSRinkey :BE@ndown:LDA#4:STAdir

1570 .ndown RTS

1580 .check LDA#31:JSRos:L DA&70:JSRos:LDA&71:JSRos:LD A#135:JSR&FFF4:STXscr:RTS

1598 .aliens LDXaliensX:LD A#17:JSRos:LDA#2:JSRos

1688 .loop LDAadead%, X:CMP #1:BEQnext:LDA#31:JSRos:LDA ax%, X:JSRos:LDAay%, X:JSRos: LDA#32:JSRos:LDAadir%, X:CMP #1:BEQleft:CMP#2:BEQright:C MP#3:BEQup:CMP#4:BEQdown

1618 .print LDA#31:JSRos:L
DAaxX,X:JSRos:LDAayX,X:JSRo
s:STXxstoreX:LDA#135:JSR&FF
F4:STXscr:LDXxstoreX:LDAscr
:CMP#32:BNEhit:LDA#129:JSRo
s:.dec DEX:TXA:CMP#8:BEGend
loop:JMPloop

1620 .next JMP dec 1638 .left DECaxX,X:LDAaxX

,X:JMPprint 1648 .right INCaxX,X:LDAax X,X:JMPprint 1650 .up DECay%, X:LDAay%, X:CMP#6:BMIdown:JMPprint 1660 .down INCay%, X:LDAay%

,X:JMPprint 1678 .endloop JMPreturn 1688 .hit LDAscr:CMP#150:B

1698 .hit2 LDYadir%, X:LDAr andoa%:STAadir%, X:TYA:CMP#1 :BE@right:CMP#2:BE@left:CMP #3:BE@down:CMP#4:BE@up

1700 .hadit LDA01:STAmedea dZ:JMPhit2

1718 .return RTS

1720 INEXT

1738 ENDPROC

1748 DEFPROCaliens: COLOUR2 1758 FORloop%=1TO?aliens% 1768 ?&78=RND(4)+5:?&71=RN D(11)+8:CALLcheck:IF?scr()3 2 THEN 1768

1778 VDU31,?&78,?&71,129:? (axX+loopX)=?&78:?(ayX+loop X)=?&71:?(adeadX+loopX)=8:? (adirX+loopX)=RND(4)

1780 NEXT: ENDPROC

1798 DEFPROCdh(x,y,a\$,c1,c
2):LOCALK:FORK=1TOLEN(a\$):A
%=ASC(MID\$(a\$,K,1)):X%=x+K1:Y%=y:?col1%=c1:?col2%=c2:
CALLdh:NEXT:ENDPROC

1880 DEFPROCINST: VDU23,1,0;8;8;8;8;19,0,4;8;

1818 PROCdh(18,1, "MAZE by Martin Cottle",1,1)

1828 PRINTTAB(8,4) "Can you help Barney get out of the maze?" "You must guide hi a safely through all the 1 6 rooms whilst destroying a 11 the creatures you meet on the way. "

1830 PRINT\* Before the doors in each room will openyou must shoot all the creatures in it. Touching one of these creatures means instant death and you will lose one of your five lives."

1840 PRINT\* On your way you must also collect all the keys in the maze. Without all of thekeys you cannot open the exit, which is found in the room in which you start, and escape from the maximum start, and escape from the maximum start, and escape from the start, and escape from the start, and escape from the start.

aze."
1858 PROCdh(16,20,"CONTROL
S\*,1,1):PRINTTAB(16,22)"\*\*\*

1868 PRINTTAB(8,23)" Z -LEFT X -

RIGHT "" : - UP

/ - DOWN \*\*\*

SPACE - FIRE\* Cdh(5.29,\*PRESS S

1878 PROCdh (5,29, "PRESS SP ACE TO ENTER THE MAZE.",1,1

1880 REPEATUNTILGET=32:\*FX 21.0

1898 ENDPROC

1988 DEFPROCENd: PROCdh (3,1 6,"6AME OVER",2,1): PROCtun e: PROCpause (388): 6COL8,8:FO RIX=8T0639STEP8: MOVEIX,8:DR AWIX,1888: MOVEI279-IX,8:DRA W1279-IX,1888: SOUND17,-15,(IX+1)DIV3,1: NEXT

1910 PROCdh(4,3, "MAZE SCOR ES",1,2):PROCdh(4,5, "====== ====",3,2)

1928 VDU28,8,31,19,8:IFSX) HIX PROCinput

1938 PROCdh(1,3, "The high score is: ",2,3):PRINTTAB(8, 7);HIX;

1948 PROCdh(1,18,"By:",1,3 ):PROCdh(4,18,H\$,2,1)

1950 PROCdh (4,16,\*PRESS SP ACE\*,1,2):PROCdh (5,19,\*TO R EPLAY\*,1,2)

1960 REPEATUNTILGET=32:VDU 26.12:\*FX21.0

1978 ENDPROC

1988 DEFPROCinput: PROCdh (8,2, "PLEASE ENTER NAME",3,2): INPUTTAB(8,6); H\$

1998 IFLEN(H\$)>16 H\$=LEFT\$ (H\$.16)

2000 HIX=SX: VDU12: ENDPROC 2010 DEFPROCTUME: RESTORE20 20: FORIX=0TO0: READP, D: SOUND 1,-15,P,D: SOUND1,0,0,0: NEXT : ENDPROC

2020 DATA33,20,5,20,5,10,1 3,10,17,10,13,10,5,10,1,10, 5,30

This listing is included in this month's cassette tape offer. See order form on Page 53. Product: \*Trek Price: £17.50 Supplier: Slogger, 107, Richmond Road, Gillingham, Kent. Tel: 0634 52303.

ONE of the most powerful disassemblers currently available for the Electron is \*Trek, enabling you to explore the innermost confines of your micro's memory.

As the program is supplied on rom, you'll need some form of sideways rom expansion board or cartridge to use it.

Typing \*HELP TREK prints a help screen displaying all the commands understood by the rom and is shown in Figure I.

The disassembler is entered on power up if there are no other language roms of higher priority or by typing \*TREK.

Initially eighty column Mode 3 is selected and you are presented with a list containing the name, number and status of all roms pre-

The status information tells you which processor type each rom is intended for – normally on the Electron this is the 6502.

It will also tell you whether it will work across the Tube, for those lucky enough to have a second processor, and whether they are either language or service roms.

Below this display you are prompted for the start and finishing addresses of the area of memory to be disassembled.

An offset address can be given enabling programs meant for sideways roms which start at &8000 to be placed in a lower area of memory before being disassembled.

If the start address lies between &8000 and &BFFF, the area of memory reserved for paged roms, \*Trek will ask for the rom you wish to disassemble.

You may select any mode but if any other than 80 column Modes 0 or 3 is selected both Ascii and text

## Trek into your Electron's memory

### STUART LOW tries out a powerful disassembler which impresses despite the odd bug

outputs are disabled.

However, these can be reenabled at any time using the control keys, which I'll come to later.

Before the disassembly begins \*Trek asks if you want to send the output to a printer. It is quite intelligent and if you answer yes it checks to see if a printer is connected and on line before proceeding.

The printer can be turned on or off, as can paged mode during disassembly using the normal Basic control keys – B, C, N and O respectively.

Ascii output can be turned on and off with Control+S and A - not A and S as stated in the manual.

During disassembly the Tab key, according to the manual, allows you to input a new start and finish address. Unfortunately the Electron doesn't have a Tab kev.

However, the BBC Micro does and it produces the Ascii code 9. Control+I on the Electron produces the same code and fortunately has the same effect.

This is a far from standard disassembler. What makes it unique is its impressive ability to comment on the code as it disassembles. Take a look at Figure II to see what I mean.

The operating system commands such as osbyte, osword, osfind and osfile are all identified and decoded.

Each is followed by a brief note stating its function, and the function of each memory location accessed is also given.

These interpretations may not be strictly accurate, however, since it is possible to write in quite obscure ways disguising the true function of the code.

When disassembling the Basic rom the entry point for Basic keywords like INKEY\$, RND, SOUND and so on are flagged.

The bytes following a BRK instruction are treated as Ascii text characters and are printed out until another BRK is encountered. This is how Basic stores its error messages.

The contents of an address are displayed if used by an indirect jump. This is useful when following operating system calls through jump vectors.

However, some roms alter these during use and therefore their contents may not

```
*TREK the Complete Disassembler 1.06
(C) Tornado Software 1986
Type *TREK for the Disassemb

*MEMORY (adr) - BASIC 1

*OSBYTE (adr) - OSBYTE

*OSWORD (adr) - OSWORD

*OSFIND (adr) - OSFIND

*OSFILE (adr) - OSFILE

Syntax: *MEMORY ddddd (*MEM
where d=decimal, h=hex digit
                                         - BASIC location use
- OSBYTE call info
                                                              call
                                                OSFILE call info
(*MEMORY &hhhh)
During Disassembly:
                                                        Printer off
                         II on
                                                              ext off
                             on
                             mode on
                                                            Page mode o
                                                (follow with 0-7)
T Enter Tables
                    creen mode
                   Enter Labels
                  Enter system command
Re-enter start & end addresses
Fast/Slow Disassembly
```

Figure I: The \*Trek help screen

### Rom review

### From Page 37

be accurate.

In addition to commenting on code \*Trek allows you to add labels – up to six characters long – to the output.

These can be used to indentify program statements, loops, branches or subroutine entry points.

They can be loaded from or saved to a file enabling you to build up a complete annotated disassembly listing of a machine code program.

Areas of memory used for data or text storage can be output as a hex/Ascii dump. The start and end points of these areas or tables can be saved along with the labels.

You can ask \*Trek to comment without entering the disassembler, using star commands from Basic.

Memory will tell you what a particular memory location is used for and osbyte, osword, osfind and osfile

8888 8882	R9 13 FF 28 F4 28 FF 85 78 3 1 85 78 3	LDA #19 JSR #FFF4	OSBYTE (Nait for vertical sync)	{ }t
1887	85 78	LDR 882 STR 678 LDR 883	Vartop low Reserved for User	{ x p
889 888	85 83 85 71 84 88 81 88 85 72	STR 271	Vartop high Reserved for User	14
880	84 BR	1 DY 488	Text pointer 1 offset	(\$
88F 811	81 88 85 72	STR \$72	Text pointer 1 low Reserved for User	1
813	89 81 95 39	100 481	Trace flag	()
817	89 FF	108 \$755		()
817 819	85 23	STR \$23	Width	( 01
818 81E 828	R9 81 85 28 R9 FF 85 23 28 51 RF 85 88 R5 28 85 81 R5 20 85 82	JSR 4AF51 LDR 42R STR 488	Assembled code buffer	( 20
828	85 88 85 28	STR &88 LDR &28	Reserved for User Assembled code buffer	{ 24
822 824	85 81	STR 881	Reserved for User	(
826 828 828	85 2C	LDA 82B STR 881 LDA 82C STA 882 LDA 82D	Variable type Reserved for User	12,
28	85 2D	LDR 820	Integer accumulator	14-
82C 82E	85 20 85 83 82 88	STA 483 LDX 488	Reserved for User	1.
838	88 89	LDY #89		1
838 832 834	89 81 28 F1 FF	LDA #81 JSR &FFF1	OSWORD (Read clock)	()

Figure II: Typical output from \*Trek

will provide information on these operating system calls.

Unfortunately \*Trek does contain a few irritating bugs - for instance Control+K (intended to disable text output) and certain star commands crashed it.

Bugs aside, this package does seem to have a lot going for it. It is easy to use, thoroughly comprehensive and even "intelligent".

\*Trek is an extremely useful and versatile tool and a virtual necessity for the machine code programmer.

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Games in stock at time of advertising, order early to avoid disappointment. Games returned by 1st Class Mail. Please add 50p Postage and Packing.

WANTED: Top quality programs for the Electron/BBC B in machine code or Basic. Send us a copy of your program on cassette for evaluation. Generous royalties paid if accepted Absolute confidentiality is guaranteed. THIS short program shows some of the interesting effects that are produced when using GCOL plot options outside the normal range.

The syntax of the command is:

SCOL option, colour

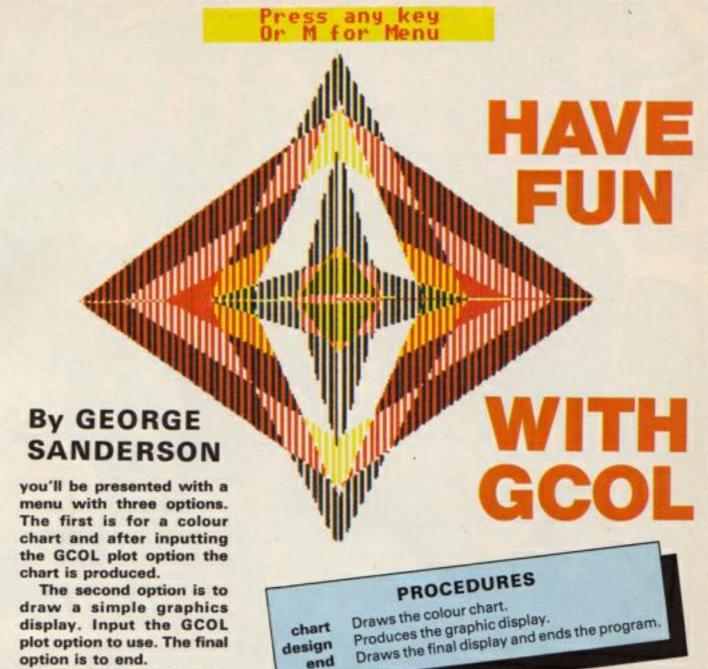
where colour is the colour to draw or plot with and option specifies the plotting mode.

Plot option 0 means plot the colour straight on to the screen. Options 1 to 3 tell the Electron to OR, AND or EOR the plot colour with the colour of the pixel already on the screen. Option 4 will use the inverse of the plot colour specified.

But what happens if you go outside this range? Well, even Acorn isn't quite sure here since the manual states that "Other values do stripey things . . . ".

This program lets you experiment with GCOL and find out exactly what happens. Some quite unusual patterns and a greater range of colour can be produced with high GCOL plot options.

When the program is run



10 REM GCOL 20 REM By G.R. Sanderson 38 REM (c) Electron User 48 MODE1: VDU 23,1,8:8:8: 8; 50 VDU28,3,25,37,3 60 COLOUR129: CLS 78 VDU28,5,23,35,5 80 COLOUR128: CLS 98 VDU28,7,21,33,7 100 COLOUR130: CLS: COLOUR1 110 PRINTTAB(4,2)" (1) Co lour chart"'TAB(4)" (2) De sign sample" TAB(4)" (3) T o end"' 'TAB(4)" Choose a n ueber\* 120 A=GET: VDU26: CDLOUR128 :CLS 130 IFA=49PROCchart 140 IFA=50PROCdesign 150 IFA=51PROCend ELSE RU 160 END 170 DEFPROCCHart 180 COLOUR3 198 REPEAT 200 B=0

228 INPUT "Enter GCOL X. 1 requ. (0 onwards) -- ) 6:CLS 230 GCOL0.3 248 FORY=8T0958STEP44 250 MOVER, Y: DRAW1300, Y 278 MOVE200.8: DRAW200.950 280 REPEAT 298 FORA=@TO44STEP4 300 GCOL6.1 310 PLOT77,500,A+B 320 NEXT 330 VDU5 348 MDVE8.A+B-15:6COL8.7: PRINTG 350 B=B+44: 6=6+1 360 VDU4 378 UNTILB>988 380 COLOUR1: COLOUR130 398 PRINTTAB(10.1)" Pr 680 UNTILX2=18 ess any key 400 PRINTTAB(10,2)\* M for Menu 418 D=SET: COLOUR128: COLOU R3:CLS 428 UNTILD=77

option is to end.

218 8%=3

That's all there is to it.

Enjoy your experimenting!

430 ENDPROC 448 DEFPROCdesign 450 COLOUR3 460 REPEAT 470 INPUT" "Start GCOL nu mber (8 onwards)".C 488 CLS 498 X1=688: Y1=358: X2=8 500 VDU29,630:450: 510 MOVE400.0 520 REPEAT 530 GCOLC.1 540 FORX=0T0360STEP90 550 MOVE0,0 560 PLOT85, COS (RAD (X)) + X1 ,SIN(RAD(X))\*Y1 578 NEXT 580 X2=X2+1 598 X1=X1-108:Y1=Y1-98:C= C+1 610 COLOUR1: COLOUR130 628 PRINTTAB(18.1)" Pr ess any key 630 PRINTTAB(10,2)\* Or M for Menu 648 D=GET: COLOUR128: COLOU

end

650 UNTILD=77 660 ENDPROC 670 DEFPROCend 680 COLOUR130 698 MOVE425,475 700 FORX=0T0360STEP18:MOV E425,475:6COLRND(12)+78,1 710 PLOT85, COS(RAD(X)) + X+ 1.5+425,SIN(RAD(X))+X+1.5+4 75 720 NEXT 738 PRINTTAB(18,14)SPC(9) 740 PRINTTAB(18,15) \* 600D BYE " 750 PRINTTAB(18,16)SPC(9) 760 VDU23; 26378; 0:0:0: 770 VDU4: VDU30 780 COLOUR128: COLOUR3 790 ENDPROC

R3:ELS

This listing is included in this month's cassette tape offer. See order form on Page 53.



### Ravenskull Castle — The Fortress of Doom

Your task is to save the village of Austburg from imminent devastation. You must enter Ravenskull Castle and retrieve the silver crucifix which the evil Baron Strieg has stolen. Only then will Austburg be safe from the Zombies who inhabit the swamp surrounding the medieval castle.

Ravenskull is a massive arcade-adventure featuring smooth 4-way screen scrolling over the 4 levels of play. Each level is 64 times the size of the screen, and there is an initially-bewildering variety of game characters including: acid pools, man-eating plants, time-doors, keys, pick-axes, scythes, spades, bows and arrows, dynamite, bells, food and wine (bewarel it may be poisonous or have strange side-effects). There are also several magical scrolls and potions to be found. These may be good or evil; for example the strength scroll gives you the power to push wooden casks, whereas the lightning-strike scroll is fatal if used.

The guardians of the castle, the vicious Ravenbees have to be avoided or, in some cases, destroyed — but there is only one way to kill them; you must discover how as you venture through the dank passages of the castle. Your quest is not an easy one - only with time, experience and a little luck will you unravel all the mysteries within Ravenskull Castle.

### PRIZE COMPETITION

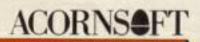
If you are skilful enough to complete Ravenskull, you can enter our prize competition. The prizes include a £100 first-prize, with Superior Software T-shirts for runners-up.

### PRICES

Electron cassette... €9.95 BBC Micro disc (51/4")... \$11.95 BBC Micro cassette......£9.95

Ravenskull is compatible with the BBC B, B+, Master





The screen pictures above show the BBC Micro version of Ravenskull,





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# TOMMUS the TOADSTOOLS

### By STUART BAIN

THE evil Wizard Wongo has cast a spell on Cadzow Forest causing all the poisonous toadstools to come to life.

One day when he's out walking in the forest the toadstools start to chase poor Tommy, a little schoolboy.

Now he's lost and needs your help to escape. You must guide Tommy along the platforms and up the ladders back to his house.

There are toadstools to avoid, holes to jump and moving bridges to negotiate, so it's no easy task. To make matters worse there's a time limit.

There is a bonus for completing each screen within the time limit, and there are toffees to collect on the way. Watch out for those deadly toadstools.

The keys are:

Z = left

X = right

? = down

\* = up

Return = jump

Full listing starts on Page 43

### PROCEDURES

moves

Moves the man.

score sweet Displays the score. Bonus for collecting sweet. Moves the toadstools.

toadstools table

Print high scores.

screen

Draws the screen.

house

Draws the house.

### VARIABLES

live%

Lives left.

X%, Y% score%

Coordinates of man.

dir%

Score. Direction of bridge.

toad\$ bonus% Toadstool characters. Bonus.

man\$() hi%()

Tommy.

nm\$()

High scores. Names.

ry 1987 ELECTRON USER 41

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This is the package that broke all records! More than a game — it's a brilliantly written collection of ELEVEN great track and field events!

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Name	
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Post to: Micro Olympics offer, Database Publications, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

EU02

### Toadstools listing

### From Page 41

18 REM \* Toesy and the \* 20 REM + Toadstools + 38 REM #By Stuart Bain# 40 REM (c) Electron User 50 PROCinit: \*FX16 60 ONERROR IFERR(>17MODE 6: VDU10.10.10: REPORT: PRINT" at line ": ERL: END 78 REPEAT 88 MODE6: PROCtitle 98 MODE5: PROCstart 188 REPEAT: REPEAT 118 PROCeove 128 IF (POINT (XX+32, YX-32) =10RPDINT(XX+32, YX-32)=3) AN Dladd%=FALSE dead%=TRUE 138 IFdead%60T0168 148 PROCtoadstools 15@ IF (POINT (XX+32, YX-32) =10RP0INT(XX+32,YX-32)=3)AN Dladd%=FALSE dead%=TRUE 168 UNTILdeadIORYI>=991 178 IFdeadXPROCdead ELSEP ROCnewsheet 180 UNTILliveX(1 198 PROCgameover 200 MODE6: PROChiscores 218 UNTIL® 228 238 DEFPROCMOVE 240 IFINKEY-49THEN\*FX210, 258 IFINKEY-50THEN+FX218. 260 IFINKEY-56REPEATUNTIL INKEY-52 270 bonus%=bonus%-18:COLO UR3:PRINTTAB(18,1);STRING\$( 4-LENSTR\$bonus%, "8"); bonus% :IFbonus%=@dead%=TRUE:ENDPR 20 280 x1=X1: x1=Y1 298 IFjump%PROCjump:80T03 88 388 HX=(FNleft-FNright)+6 318 IFFNjump ANDNOTladdIS OUND1,-15,20,1: jump%=TRUE: j ump1%=8:PKUC]ump:5010388 320 IFXX+HX>1216ORXX+HX<0 H%=8 330 IFladdZHZ=0 348 XX=XX+HX: IFHX60T0388 350 IFFNup ANDPOINT (XX, YX -32)=31add%=TRUE:Y%=Y%+32 368 IFFNdown ANDPOINT(XX.

YZ-64)=31addZ=TRUE: YZ=YZ-32

378 IFPOINT (XX+32, YX-64) = 1ANDladd%ladd%=FALSE:PROCea n(x1,y1):man1=8:man11=8:PRO Cman (XX, YX): ENDPROC 380 IFPOINT(XX, YX-64)=0AN Djump%=8dead%=TRUE 398 IFXX=xXANDYX=yXENDPRO C 488 PROCean (x1,y1) 418 IFPOINT(XX+8, YX) = 2PRO Csweet 428 IFHX=FALSE ANDNOTLadd **260T0448** 438 san%=(san%+1)MOD2:san 17=8: IFHX (@man1%=2ELSEIFlad d%man1%=4 448 PROCean (XX, YX) 458 ENDPROC 468 478 DEFPROCjump 488 jump1%=jump1%+1: V%=32 : IF jump 1%>2V%=-32 498 IFXX+HX>12160RXX+HX<8 H%=8 588 XX=XX+HX: YX=YX+VX 510 IFjump1%)3jump%=FALSE 528 ENDPROC 538 548 DEFFNleft 550 IFINKEY-980RFNjoy=40R FNjoy=20=TRUE 568 =FALSE 570 DEFFNright 580 IFINKEY-670RFNjoy=80R FNjoy=24=TRUE 598 =FALSE 600 DEFFNjuap 618 IFINKEY-740RFNjay>8=T RUE 620 =FALSE 630 DEFFNup 640 IFINKEY-730RFNjoy=1=T RUE 650 =FALSE 660 DEFFNdown 678 IFINKEY-1850RFNjoy=2= TRUE 688 =FALSE 780 DEFFNjoy=(127-?&FCC8) 710 DEFPROCman(x1,y1) 720 GCOL3.2: MOVExX.yX: VDU 5: PRINTman\$ (man%+man1%): VDU 730 ENDPROC 748 DEFPROCSWeet

750 MDVEXX+64.YX: SCOL3.3:

elav (300)

VDU5,127,238:SOUND3,-15,200

.2:score%=score%+58:PROCsco 768 ENDPROC 770 DEFPROCScore 788 IFscore%>99999score%= score%-100000 798 VDU4: COLOUR3: PRINTTAB (0.3); "SCORE: ": STRING\$ (5-LE NSTR\$score%. "8"):score% 800 ENDPROC 818 828 DEFPROCtoadstools 830 IFscreen%(>1PROCbridg 848 TX=(TX+1)MOD5 850 toad\$=toad\$(T%) 860 IFscreen%=3ANDT%=2PRD Ctstools: ENDPROC 878 IFtoad\$=""ENDPROC 888 chr \$= CHR \$32: IFRND (5-1 screen%=1))=1chr\$=CHR\$226 898 IFTXMOD2toad\$(TX)=chr \$+LEFT\$(toad\$,17)ELSEtoad\$( TX)=RIGHT\$(toad\$.17)+chr\$ 988 rowx=(32-(TX+5+7))+32 -1 918 SCOL3,3: MOVE64, rowX: V DU5: PRINTtoad\$ 928 MOVE64, row%: PRINTtoad \$ (TX) : VDU4 930 ENDPROC 948 DEFPROCtstools 958 t\$=LEFT\$(toad\$,5)+RIG HT\$(toad\$,5):chr\$=CHR\$32:IF RND (4)=1chr\$=CHR\$226 960 t\$=RIGHT\$(t\$.9)+chr\$: toad\$(2)=LEFT\$(t\$.5)+STRING \$(8," ")+RIGHT\$(t\$,5) 978 GCOL3,3: MOVE64,479: VD U5:PRINTtoad\$:MOVE64,479:PR INTtoad\$(2):VDU4 988 ENDPROC 990 DEFPROChridge 1888 plat%=plat%+dir%: IFpl at%=70Rplat%=11dir%=-dir% 1818 VDU17,1,31,plat7-1,18 ,32,224,224,32 1020 IFTZ=1FORI=1T0130:NEX 1030 IFPOINT (XX. YX-64) = BAN Djump%=FALSE dead%=TRUE 1848 ENDPROC 1858 DEFPROCHELay (DX): TIME =0:REPEATUNTILTIME>D%:ENDPR 1060 1878 DEFPROCdead 1888 SOUND1.3,119.45:PROCd

1898 REPEAT: PROCean (XX.YX) : YX=YX-64: PROCman (XX, YX):SO UND0,0,0,0:SOUND1,-15,Y%/8. -1:UNTILY%(97 1100 PROCean (XX, YX): SOUND® 8.8.8 1110 liveZ=liveZ-1:IFliveZ (1ENDPROC 1120 bonus%=3000: PROCscree n: ENDPROC 1130 1140 DEFPROCnewsheet 1150 VDU28,4,16,15,14:COLO UR131: CLS: COLOUR8: PRINT" B ONUS: ": STRING\$ (4-LENSTR\$bon us%, "0");bonus%: VDU26 1168 RESTORE1188: FORIX=1TO 19: READA: SOUND1, -15, A, 2: NEX 1178 1188 DATA 4,52,12,60,20,68 ,24,72,32,80,40,88,48,96,52 ,100,100,100,100 1198 screen%=screen%+1: IFs creen%)3screen%=1:live%=liv eX+1:IFliveX>9liveX=9 1200 score%=score%+bonus%: bonus X=3000 1218 PROCscreen: ENDPROC 1220 DEFPROCoameover 1238 PROCdelay (188) 1248 VDU28.4.16.14.14:COLO UR131: CLS: COLOUR@: PRINT " 8 AME OVER\*: VDU26 1250 RESTORE1270:FORIX=1TO 14: READA, B: SOUND1, -15, A+48. B\*1.3:SOUND1.0.0.B:NEXT 1268 REM PLAYS GAMEOVER TU 1270 DATA12,4,12,2,5,32,10 .12,4,32,2.5,48,18 1280 DATA12,4,32,2.5,48,5. 12,4,32,2.5,48,5,12,5,32,10 1298 PROCdelay (388): ENDPRO C 1388 1310 DEFPROChiscores 1328 VDU23.1,0;0;0;0;:\*FX2 1.8 1330 placeX=0:REPEAT:place %=place%+1:UNTILplace%=90Rs core%>hi%(place%) 1340 IFplace%=960T01420 1350 FORIX=STOplaceXSTEP-1 :hi%(I%)=hi%(I%-1):ne\$(I%)= nas(IX-1):NEXT:hiX(placeX)= score%:na\$(place%)="":PROCt

### From Page 43

able

)-1)

1360 VDU31,0,5:PRDCmiddle(
"Please enter your name"):n
ame\$="":YX=2\*placeX+5

1378 REPEAT:REPEAT:XX=8ET: UNTILXX>31ANDXX<1280RXX=13 1388 IFXX=127ANDLENname\$>8 name\$=LEFT\$(name\$,LEN(name\$

1398 IFXX>31ANDXX<127ANDLE Nname\$<10name\$=name\$+CHR\$XX 1400 PRINTTAB(25,YX);name\$ :" ":UNTILXX=13

1410 nms(placeX)=names 1420 PROCtable:PRINTTAB(9, 24); "Press SPACE to replay" ::REPEATUNTILINKEY-99:ENDPR OC

1430 DEFPROCtable 1440 PROCheader

1450 FORIX=1TO8: PRINTTAB(5, IX\*2+5); IX; ") "; STRING\*(5-LENSTR\$hiX(IX), "0"); hiX(IX); "....."; na\$(IX): NEX

1460 ENDPROC

1478

1480 DEFPROCinit

1498 VDU23,224,255,24,36,3 6,66,66,129,255

1500 VDU23,225,129,129,129

.129,255,129,129,129 1510 VDU23,226,24,126,255,

255,24,24,24,68

1528 VDU23,237,64,192,56,6

0,60,28,3,2 1530 VDU23,238,0,0,238,138

,234,42,238,8 1548 VDU23,227,28,63,128,1 18,97,34,28,68,23,228,110,1

10,110,118,60,24,24,28,23,2 29,126,126,247,251,60,118,1 10,119

1550 VDU23,230,56,252,30,1 10,134,68,56,68,23,231,118, 118,118,110,68,24,24,56,23, 232,126,126,239,223,60,110,

118,238 1560 VDU23,233,152,188,189 ,189,153,255,126,126,23,234 ,126,126,126,255,129,129,1,

1578 VDU23,235,25,61,189,1 89,153,255,126,126,23,236,1 26,126,126,255,129,129,128, 128



1590 DIMman\$(5),toad\$(4),h iX(9),ne\$(9):FORIX=1TO8:hiX (IX)=1700-IX\*200:nm\$(IX)="B AINY SOFT":NEXT

1600 line\$=CHR\$8+CHR\$10 1610 RESTORE1620:FORIX=0TO 5:READA,B:man\$(IX)=CHR\$A+li ne\$+CHR\$8:NEXT

1620 DATA227,228,227,229,2 38,231,238,232,233,234,235,

1638 ENVELOPE3,1,-18,-37,-89,24,13,46,126,8,8,-126,12

1648 ENDPROC

1650 DEFPROCStart

1660 live%=3:score%=0:bonu

s1=3000:screen1=1

1678 PROCscreen 1688 ENDPROC

1698 DEFPROCSCreen

1780 VDU23,1,8;8;8;8;:COLD

UR128: CLS

1710 COLOUR1:FORIZ=8T028ST EP5:PRINTTAB(0,IX);STRING\$( 20,CHR\$224);:NEXT:PRINTTAB( 17,3);CHR\$224;CHR\$224;CHR\$2 24;

1728 COLOUR2:FORIX=4T014ST EP18:VDU31,8,IX,237,31,19,I X+5,237:NEXT

1730 FORIX=8T018STEP10:PRO Cladder(8, IX):NEXT:FORIX=3T 023STEP10:PROCladder(19, IX) :NEXT

1740 PROChouse

1750 SCOL0,1:MOVE688,1888: DRAW928,1888:DRAW928,944:DR AW688,944:DRAW688,1888

176@ PROCscore:PRINTTAB(0, 1); "LIVES: ";liveXTAB(10,1); STRING\$(4-LENSTR\$bonusX,"0" );bonusXTAB(12,3); "L=0";scr een%

1778 PROCsetvar

1788 RESTORE1888:FORIX=1TO 13:READA:SOUND1,-15,A,3:NEX T:SOUND1,-15,181,7

1798 REM PLAYS START TUNE 1888 DATA181.117.129.117.1 89,121,137,121,181,117,129, 117,181

1818 PROCdelay (288)

1828 ENDPROC

1838

1840 DEFPROChouse

1850 COLOUR1: VDU31,17,1,25 0,251,8,8,10: COLOUR3: VDU252

.253

1868 ENDPROC

1870

1888 DEFPROCsetvar

1898 XX=8:YX=191:manX=8:ma n1X=8:PROCman(XX,YX):jumpX= FALSE:laddX=FALSE:deadX=FAL SE

1988 T%=8:FORI%=8T04:toad\$
(I%)=\*\*:FORJ%=1T018:chr\$=CH
R\$32:IFRND(5-(screen%=1))=3
chr\$=CHR\$226

1910 toad\$(I%)=toad\$(I%)+c hr\$:NEXT:NEXT

1928 ONscreen%60SUB1948,19 78.2828

1938 ENDPROC

1948 REM +SCREEN 1+

1950 GCOL3,3:VDU5:FORIX=0T 04:MOVE64,(32-(IX+5+7))+32-1:PRINTtoad\$(IX):NEXT:VDU4

1968 RETURN

1978 REM +SCREEN 2+

1988 toad\$(2)="":60SUB1948

1990 PRINTTAB(6,18); SPC8;

2000 plat%=7:dir%=1:COLOUR 1:VDU31,plat%,18,224,224

2010 RETURN

2020 REM \*SCREEN 3\*

2030 GOSUB1970:FORIX=1TD10 :chr\$=CHR\$32:IFRND(4)=3chr\$ =CHR\$226

2040 toad\$(2)=toad\$(2)+chr \$:NEXT:toad\$(2)=LEFT\$(toad\$ (2),5)+STRING\$(8," ")+RIGHT \$(toad\$(2),5)

2858 SCOL3,3:MOVE64,479:VD U5:PRINTtoad\$(2):VDU4

2060 RETURN

2070 DEFPROCladder (X,Y)

2000 VDU5:6COL0,3:MOVEX#64 ,(32-Y)#32-1:FORI=1T05:VDU2

25,8,10: NEXT

2090 VDU4: ENDPROC

2100 DEFPROCheader

2118 CLS: VDU23,1,8:8:8:8:

2128 PRINTTAB(7,1); STRING\$
(24,"-") TAB(5); CHR\$226; T

OMMY and the TOADSTOOLS ";C HR\$226'TAB(7);STRING\$(24."-

2130 ENDPROC 2140 DEFPROCtitle 2150 \*FX21.0 2168 PROCheader: PRINT'TAB( 12); "By Stuart Bain" 2178 PRINT'TAB(12): "HI-SCO RE=":STRING\$ (5-LENSTR\$hi% (1 ), "0"); hi%(1) 2188 PRINT'TAB(2,18);"1/2 SOUND OFF/ON"; SPC3; "P/R PAU SE/RESUME\* 2198 PRINTTAB(2,12); "Z...L EFT"; TAB(29,12); "X...RIGHT" TAB(15,13); "Ret...JUMP"TAB( 2,14); "+... UP"; TAB(29,14); " ?... DOWN\* 2288 PRINTTAB(2,16); "A joy stick maybe use in conjunct ion "TAB(5,17); "with the FIR ST BYTE interface" 2218 PRINTTAB(6,28); "PRESS 'I' FOR INSTRUCTIONS"TAB(1 8,22); "OR"; TAB(10,24); "PRES S SPACE TO PLAY":

2228 XX=8: TIME=0: REPEAT: IF INKEY-38XX=1ELSEIFINKEY-99X 7=2 2238 UNTILXX>80RTIME>1808 2248 IFXX=@PROCtable:PRINT TAB(10,24); "PRESS SPACE TO PLAY"::TIME=8:XX=8:REPEATUN TILTIME>5000RINKEY-99: IFINK EY-99XX=2 2250 IFXX=1PROCinstruction 5: XX=0 2260 IFXX<280T02160 2278 PROCdelay(108): \*FX21. 2288 CLS: VDU31, 0, 12: PROCmi ddle("JOYSTICKS (Y/N) ?"):j ov%=FALSE: B\$=BET\$: IFB\$="Y" j ovX=TRUE ELSEIFB\$(>"N"60T02 288 2290 ENDPROC

2318 DEFPROCinstructions

2338 PRINT ": PROCaiddle("T

he Evil Wizard Wongo has ca

2320 PROCheader

ij o ni ij e if 02 237 any up") bor n"):

> 2388 PROCspace: PROCheader 2398 PRINT': PROCeiddle("A

st an evil"):PROCeiddle("sp ell on Cadzow Forest.All th e Deadly")

2340 PROCmiddle("Poisonous Toadstools have COME TO LI FE"):PROCmiddle("and are pe rsuing poor Tommy,"):PROCmi ddle("the little school boy .")

2350 PROCspace:PROCheader
2360 PRINT':PROCaiddle("Y
ou must quide Tommy along t
he forest"):PROCmiddle("pla
tforms and up the ladders t
o his"):PROCmiddle("house i
n the corner.You lose a lif
e if")

2370 PROCmiddle("you touch any toadstools on the way up"):PROCmiddle("or if your bonus runs out,and you gai n"):PROCmiddle("a life ever y 3 sheets.")

This listing is included in this month's cassette tape offer. See order form on Page 53.

bove each ladder is a toffe

e which"):PROCmiddle("Tomay

can take for bonus points.

If you"):PROCmiddle("clear

a sheet, your bonus time is added"): PROCaiddle("to your

2400 PRINT ': PROCeiddle("W

ATCH OUT FOR THE TOADSTOOLS

2420 DEFPROCSpace: PRINTTAB

(7,24): "PRESS SPACE TO CONT

INUE"::REPEATUNTILINKEY-99:

2448 PRINTTAB(28-LEN(B\$)/2

2438 DEFPROCaiddle(B\$)

2418 PROCspace: ENDPROC

score. ")

ENDPROC

):B\$

2450 ENDPROC

IN LEVEL 3")

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\*)

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## Micro Messages

I HAVE recently bought an Electron for my five-year-old son as a Christmas present and, as I know next to nothing about computers, I am hoping you can help me.

I have bought the October and November 1986 issues of your magazine in the hope that these would help.

What I need is information on software suitable for a five-year-old.

I have sent for the Fun School and Classic Arcade Games tapes, the first because it gave an average age and the second because he can play two of the four games.

The Adventure game you advertise, The Magic Sword, is said to be suitable for small children but at five your reading is limited and I do not know if this is ok.

I hope you can see my problem. I have tried both my local computer stores, but their Electron software is very limited and they were not very helpful in my request for equipment to suit the younger child.

Any ideas you have for literature for myself to help him, or a list of software suitable would be very much appreciated. – M. Purnell, Croesyceiliog, Cwmbran, Gwent

 You'll find a four page pull-out guide to educational software in the September 1985 issue of Electron User. This lists all

# Software for a five-year-old

the software that was available at the time (there's even more now), describes each product and supplies the address of the company.

Also many of the programs we have published in the past three years can be used by young children. Crocodile Tears in the May 1986 issue is particularly good.

The Magic Sword can be used by young children but they may need a little help from an adult at first. They soon get the hang of it though.

## Easy on the eyes

AFTER inputting about half a long program the other day, my eyes became so crossed following the listing in Electron User that my super lazy streak came to the fore to find an easier way.

I dictated the program on to cassette and played this back, at the same time typing in the program.

Checking for bugs is sim-

pler as well, just play the tape and follow the listing on the screen.

However remember that the speed of dictation is the speed at which you will have to type in the program.

Try it to make life easier and improve accuracy. - Raymond Speare, Stoke Hill, Exeter.

## Constricted crocodile

FOR some time I have enjoyed your listings and played the results with great pleasure but now I have a problem.

Some of the programs I have typed in like Crocodile Tears don't work and give the message "No room at line".

Could it be because I have a Plus 1 connected to my Electron?

I also want to say that your latest program Howzat is a lot of fun and tells me how cricket is to be played, because in Holland nobody really knows. — Patrick van der Pas, Rijswijk.

The Plus 1 does not affect

the memory available for Basic programs, so this isn't the problem.

Many programs are rather tight on memory and you need to take care when entering listings.

Do not enter any spaces except where absolutely necessary, otherwise you'll run out of memory and the program will stop with an error report.

## Balanced diet for all

I'M INTO my third year of Electron User and what do I think of it so far?

Having dallied on occasions with other computer periodicals I am convinced that Electron User is still the only magazine for Electron owners presenting as it does a nicely balanced diet for all, from beginners to experienced hacks.

The features which, I think, set its high standard are:

- The regular informative articles by R. Waddilove – I suspect this is really a nearintelligent computer which churns out these programs when required.
- The excellent readerinvolvement section Micro Messages.
- The clever, artistic illustrations. These are always witty and relevant (don't tell me these are also done by R. Waddilove).

In some instances the illustrations are of a higher standard than the actual games. For example those for A Day At The Races far surpassed the game which I found dull and featureless.

(There is a bit of sour grapes here, of course, as I had offered you a more real-

### Tips for the Plus 3 fraternity

I READ with interest the letter from Mr. Richard Bill-inghurst in Micro Messages, December 1986, regarding the addition of a second disc drive to an Electron and Plus 3 setup.

I agree with your reader that the Plus 3 manual is somewhat vague as to such an addition.

I have recently successfully added a further drive to my Plus 3, in my case a 5.25in drive.

I would like to offer some advice gained from my experience to potential second drive purchasers among your readers.

The Plus 3 will take any size disc drive provided it has its own mains power supply. (I bought Watford Electronic's CS400S).

The ADFS automatically copes with the larger size and storage capacity of a 5.25in drive.

A card edge connecting unit is required (costing under £4), which is clamped on to the cable of the new drive and connects to the edge connector at the rear of the Plus 3's own drive.

It is essential that when you buy your new drive it is

switched internally to drive 1, otherwise it will not work. This can be completed in a few minutes by any reputable dealer.

I hope that this will be of assistance to your readers and help them to avoid some of the pitfalls I encountered.

I have had a second drive now for two months and can thoroughly recommend it. It really takes the ache out of the \*BACKUP and \*DIR-COPY commands.

Many thanks for a fine magazine. - John Thorogood, Bishops Stortford,

### From Page 47

istic and graphic horse race game shortly before your publication).

Collectively my Electron Users are a mine of information, advice and ideas. But searching through the mine can be time consuming and chaotic.

I am sure that many subscribers, like myself, refer to their copies constantly for programming and technical information.

Have you considered the publication of an annual index of the year's contents?

V. J. Horgan, Didcot, Oxon

 We've had suspicions for some time that Roland might be Database's answer to Metal Mickey.

However, the superb artwork you refer to is by a charming young lady called Pam Dunkerley.

Sorry we couldn't publish your horse race game. Two excellent racing programs arrived within days of each other and it was a pity we couldn't use them both. There was nothing to choose between the two so literally a toss of the coin decided which we were going to use.

We like the idea of an index and we'll bear it in mind for the future.

### Alternative language

IN the not too distant future I am considering buying the Lisp, Logo and Pascal rom cartridges, but before I go to any great expense, I should like to know more information regarding their purpose. — B.R. Rushforth, Bradford, West Yorkshire

 These are alternative programming languages to BBC Basic. Some languages are more suited to a particular type of application than others.

We haven't the space to go into any depth here but you'll find a full review of the cassette versions of Lisp and Pascal in the February and March 1985 issues of Electron User.

The rom versions have many more functions and

WHAT would you like to see in future issues of Electron User?

What tips have you picked up that could help other readers?

Here is your opportunity to share your experiences.

Remember that these are the pages that you write yourselves. So tear yourself away from your Electron keyboard and drop us a line.

The address is:

Micro Messages Electron User Europa House 68 Chester Road Hazel Grove Stockport SK7 5NY.

enable you to write much bigger applications.

We haven't reviewed Logo, but Mike Plummer's Pogo is a good introduction to the language. This two part series can be found in the December 1986 and January 1987 issues of Electron User.

### Morse on the Electron

WITH regard to the letter from Mr. Coggin in the November 1986 Electron User, I wish to confirm that the Centronics output of the Plus 1 can indeed be used for the activation of external devices.

I am using these ports for sending and receiving morse code via my amateurband transceiver.

However, instead of poking the address directly:

### ?&FC71=value

I am using the "official" Acorn routine for writing to the port, as this ensures correct operation irrespective of possible different versions of the Electron or whether a second processor is present.

In Basic this routine is as follows:

AX=&93 XX=&71 YX=value CALL &FFF4

Any masking of the bits can be directly carried out on Y% before the call. The machine code equivalent is:

> LDX #471 LDY #value JSR &FFF4

As yet I have been unable to read from this port and I suspect that it is configured for write-only by the hardware.

In my case I am using bit 7 of address &FC72 as the input port. The official method of reading is somewhat long-winded in Basic:

AX=492 XX=472 YX=0 valueX=(USR(&FFF4)AND &FF00 80)DIV &10000

If bit 7 is set a value of 192 is returned on my machine, so:

### bit%=value% DIV &BF

returns a 1 for bit set, 0 if not set. A direct peek is much simpler if an "unofficial" routine will work on your machine:

bitX=(?&FC72 AND &88)DIV &8

which returns a 1 for a bit set. The machine code routine is simpler:

> LDA #&92 LDX #&71 LDY ## JSR &FFF4 STY &78

the value of the port is now in &70 from where it can be recovered by a direct peek:

### value%=?&78

Incidentally, this port requires a negative logic to give the 1s and 0s.

Finally, the so-called slow Electron can send and receive morse code much quicker than the average human can! And that's using only Basic programs.

— A.E. Ashby, Knottingley, West Yorks.

## Adding a database

I BOUGHT my Electron in September 1985 and since then I have added a Plus 1 and Plus 3 with View word processor. I would now like to add a database to my system and am particularly interested in Acornsoft's Viewstore.

Can you tell me if this can be obtained on rom cartridge for the Electron? I cannot find any reference to this anywhere. – Paul Quinn (age 10), Barrhead, Glasgow

Viewstore is only available for the BBC Micro on rom. We haven't tried it on the Electron but one of our readers has reported that it works ok.

You'll need some means of plugging the rom in – for instance a blank cartridge or Rombox. The Electron's keyboard layout is different to the BBC Micro and the new keys to use can be found in Micro Messages July 1986.

### Lacking lower case

I AM sure somebody out there can help mel Being completely non-technically minded, I was very proud of myself when shortly after receiving my Plus 3 I managed to create IBOOT files for my discs, the one for View consisting of:

\*MORD
MODE 3
PRINTER SR488
MICROSPACE
LOAD LETTERHEAD
\*CAT

This does nearly everything I need, but to me two things are still lacking, one very important and one less so but desirable.

Try as I might I cannot find how to enter an instruction to put my Electron into lower case – and for goodness sake, who wants to write letters all in capitals?

Also I usually enter Control+S followed by 04000 (to change the background to blue), to ease the strain on my poor aged eyes - but how do you do that in a !BOOT file? I tried S 04000 but that didn't work.

So if one of the tame genii among your readers can supply me with the correct sequence of hieroglyphics to pad out my IBOOT I should be most grateful. -Mrs. M. Charlton, Kingston Park, Newcastle upon Tyne. Insert the following lines just before \*CAT:

> \*FX202,48 \*KEY8 1584888 \*FX138,8,128

The first command switches the Caps lock light off and the other two define a function key to change the background colour to blue.

### Switching characters

EARLY this year we bought an Electron with which we are delighted and we have recently added a printer - a Panasonic KP-X1080.

My problem is that I would like to be able to change from English to the German or French character sets while printing a document.

This is not possible with the otherwise excellent Mini Office word processor which we have at present.

Please could you tell me which of the word processing packages currently available for the Electron, on cartridge or cassette, will enable me to send control codes directly to the printer.

Regrettably, the Electron seems to have disappeared entirely from our local shops and with it any source of information. Three cheers for Electron User which more than fills the gap! -Helen Muir, Crewe, Cheshire

 We haven't had any experience of Panasonic printers but if it is Epson compatible you should be able to select a character set by sending the following sequence of codes to the printer: 27,82,n where n is the character set.

To do this you'll need a word processor that allows you to insert printer control codes.

Acornsoft's View and

Slogger's Starword both enable you to this. However, you'll need a printer driver generator to go with them.

Slogger can supply a suitable program for Starword and you'll find a View driver in the August 1986 issue of Electron User. Alternatively, you can use Acornsoft's View Printer Driver Generator for the BBC Micro - we haven't tried it ourselves but many of our readers have reported that it works ok.

### Random reflections

I HAVE now had my Electron for quite a while, and until recently I was convinced that the random number generator fed out an unpredictable sequence of numbers.

However this seems not to be the case. Immediately after turning on your Electron, type in and run this small program:

10 CLS

28 FOR i=1 TO 18

38 PRINT: RND (100)

**40 NEXT** 

Your Electron will generate the numbers 19, 29, 27, 90, 79, 55, 9, 98, 29. There may be a slight variation if you have a Plus 1 or Plus 3 fitted.

If you turn off your Electron and repeat the operation the same sequence of numbers will appear. Not exactly unpredictable, is it?

More importantly, this means that every time a program is run which uses random numbers to control events, it will be possible to

However on the

very rare occasions

that mistakes may

occur corrections will

be published as a

matter of urgency.

Should you encounter

error messages when

you type in a program

tested.

predict those events.

Snap Dragon in the July 1986 issue written by Keith Owens and myself, will illustrate what I mean.

Turn off your Electron, then turn it on and load and run Snap Dragon (assuming that you already have it saved).

If a Plus 1 and Plus 3 are fitted the first cards printed will be as follows: Queen of Diamonds, Jack of Hearts, Ace of Diamonds, Ace of Diamonds and so on.

Every time Snap Dragon is loaded immediately after your Electron is turned on, these cards will be repeated.

The cards may vary slightly if you do not have a Plus 1 and Plus 3 fitted.

Before buying my Electron I used to own a Texas computer which contained within it's Basic language the command RANDOMIZE.

This reseeded the random number generator so that it produced an unpredictable sequence of numbers every time it was used.

Is there a similar command available on the Electron? If there is, I have never seen any reference to it.

My own solution to this problem is as follows: For any program relying on the random number generator add the following line:

CLS: INPUT TAB(2,16) \*Input a number between 1 and 188: nuel: FORIX=1 TO nuel: A=RND: NEXT

Just insert it into an appropriate place near the start of your programs and, provided you input a different value into num% each time you switch on, your Electron will become almost unpredictable.

they will almost certainly be the result of your own typing mis-

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

In Snap Dragon it should be inserted at line 55, and should be preceded by the condition IF Z%=0... This will ensure that the routine will only be called once, when the Electron is first switched on.

Because Snap Dragon runs in Mode 1 there is not a great deal of memory to spare, so just by adding this extra line you may get the dreaded 'No room' error message.

If so, don't worry, just delete the lines holding the instructions, 1960 to 1990. You probably know them by now anyway. You will now have all the memory you need.

I hope this tip proves useful to your readers. Many thanks for a great magazine. - Philip Ord, Egremont, Wallasey, Merseyside.

 When the Electron powers up it seeds the random number generator with the same value each time - it's written into the Basic rom.

The random numbers generated are in fact not random but follow a very complex sequence based on this seed. If the seed is the same each time it follows that the sequence will be the same also.

A quick and simple method of seeding the generator is with:

### RX=RND (-TIME)

A suitable place to insert this would be just after the instructions.

The time taken to read these will always be slightly different so the random number generator will be seeded with a different number each time.

### Epson dump

HAVE you ever published a screen dump for an Epson, or Epson compatible printer? If any readers know of one, I would be most grateful for any information. -Simon Barker, Cowes, Isle of Wight

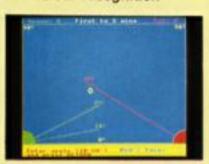
• We have published several screen dumps - the most recent were in the June 1986 issue of Electron User where you'll find dumps for both Shinwa and Epson printers.

ALL programs printed in this issue are exact reproduction of listings taken from running programs which have been thoroughly





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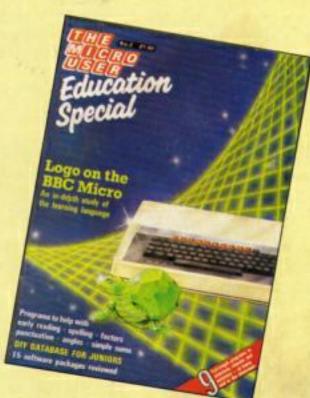
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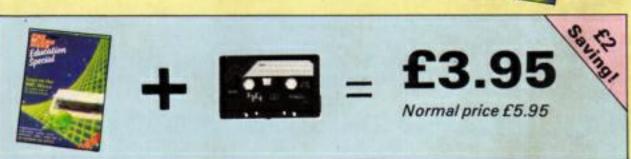
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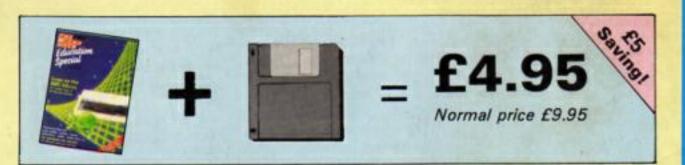
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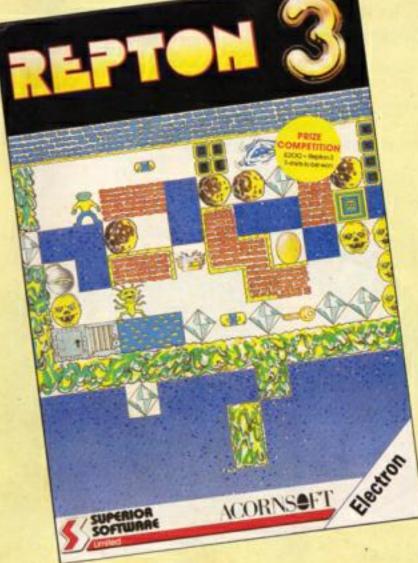




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punctuation.

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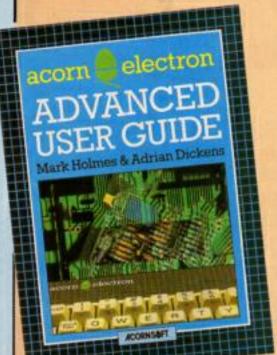
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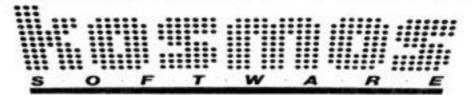
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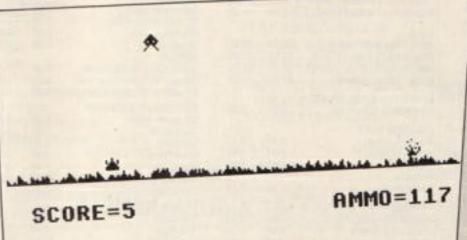


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1 BX=8:BY=8:bX=1:MODE4: VDU23,225,24,68,126,219,126,36,66,129,23,226,16,64,2,3 2,149,81,58,124,23,224,8,8,8,73,93,62,127,127,23,227,8,68,48,68,123,152,28,8,19,1,RND(7);8;23,1,8;8;8;8:ENVE LOPE1,1,-15,-8,-3,18,18,18,18,8,8,8,8,8,8,8,8,8,8,8;8:CLS:XX=19:YX=27

2 FOR1=10T01279STEP10:M

OVE1,110:MOVE1-10,110:PLOT8
5,1-RND(10),RND(15)+110:NEX

T:S=0:A=120:REPEAT:PRINTTAB

(2,30) "SCORE=";S;TAB(22,30)
"AMMO=";A;" ";TAB(XX,YX)" "

;:XX=XX+INKEY(-98)-INKEY(-6

7):IFXX(1XX=1ELSEIFXX)38XX=
38 ELSEIFINKEY(-74)PROCfire

3 PRINTTAB(XX, YX) CHR\$(2 24);:IFbX=1 AND RND(38)=1 8 X=RND(38):BY=1:PROCbomb ELS EIFbX=8 PROCbomb

4 UNTILFALSE

5 DEFPROCHOED: PRINTTABL

BX.BY) \* \*;: IFXX>BX BX=BX+1 ELSEIFXX BX BX=BX-1

6 RF=RND(3)-2:BX=BX+RF:
BY=BY+1:IFBX=XX AND BY=YX S
OUND0,-15,6,10:PRINTTAB(7,2
3)\*DEAD!\*''\*PRESS P TO PLA
Y AGAIN\*:REPEAT:K\$=GET\$:UNT
ILK\$="P":RUN

7 PRINTTAB(BX,BY) CHR\$2 25:bX=8:IF BY=27 bX=1:PRINT TAB(BX,BY)CHR\$226;:SOUND8,-15,4,5:S=S+5

8 ENDPROC

9 DEFPROCFIRE: IFA=860T0
18ELSEA=A-1: SOUND&11,1,255,
5: 6COL8,1: MOVE(XX+32)+16,14
8: DRAW(XX+32)+16,1888: 6COL8
,8: DRAW(XX+32)+16,148: IFXX=
BX SOUND8,-15,5,8: PRINTTAB(
BX,BY) CHR\$227:: bX=1: FORW=1T
0158: NEXT: PRINTTAB(BX,BY)\*
";: bX=1: BX=8: BY=8: S=S+58
18 ENDPROC

## Mandala

HERE'S a short listing by S. Collins to produce an interesting mandala pattern.

1 MODE1:FLAG=8:L=1 2 GCOL8,L:A=888:B=688

3 FORF=8 TO 15:MOVE 688 ,A:DRANB,588:A=A-28:B=B+28: NEXT

4 FORF=8 TO 15:MOVE688, A:DRAWB-18,588:A=A-28:B=B-2 8:NEXT

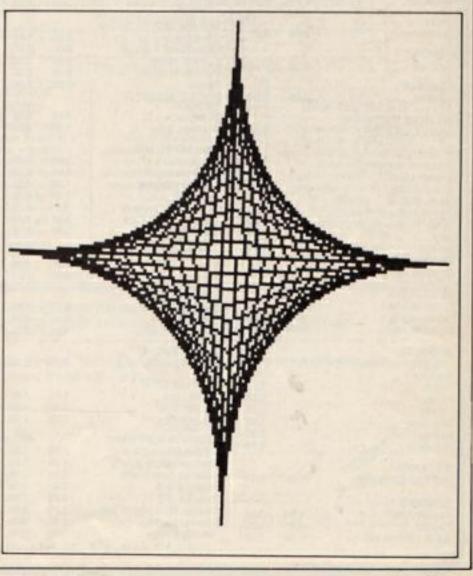
5 FORF=8 TO 15:MOVE688. A:DRAMB-18,588:A=A+28:B=B-2 8:NEXT 6 FORF=@TO15:MOVE60@,A: DRAWB+1@,500:A=A+2@:B=B+20: NEXT

7 IF FLAS=8 FLAS=1 ELSE FLAG=8

8 IF FLAG=1 GCDL0,7:80T

9 IFL=8 OR L=1 L=L+1 EL

SE L=0 10 60T02





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### First program TRY typing the following into your Electron, remembering to press the Return key at the end of every line: 10 first=100 28 second=200 30 sum=first+second 40 PRINT SUB As you'll know by now this is a program. Not that it does much. It just sits in the micro's memory waiting. Clear the screen with CLS and you'll see whatever you've 0 typed in disappear from the display. But while you may not now be able to remember what 0 you've typed in, the Electron does. Or at least it remembers the lines that began with numbers. You can prove this by telling the micro to list them out with LIST, when the program will duly appear. The trouble is it's still not doing anything. And it's no surprise. The reason it's not doing anything is that you've not told it to do anything! The Electron is a typical Jobsworth. You know the type they'll do what they're told to do but do nothing on their own initiative as "It's more than my job's worth". So get the computer to run the program by using the aptly 0 named command RUN. And unless you've made a typing error, the answer 300 will appear on the screen. There should be no mystery as to why this has happened. 0 The first two lines of the program assign values to the numeric variables first and second while the third line adds the two values and stores the result in another numeric, sum. The next line uses PRINT to display this. And that sums up the first program. 0 Concatenation Flushed with success from the last program, let's move on to: 18 moggys="cats" 20 autts="dogs" 38 space\$=\* \* 40 fullStops="." 50 weather == moggy \$+ space \$+ and "+ space \$+ a 60 PRINT "It's raining" weather\$ fullSto From the dollar sign (\$) at the end of the variable names, you should see that the first four lines are just concerned with 0 assigning strings to string variables. While lines 30 and 40 aren't really necessary I've put them in 0 as listing is easier to follow if you type in the names rather than a space or a full stop when lines get complicated. Line 50

58 weather\$=moggy\$+" "+"and"+" "+mutt\$

prints out the message. Can you see why:

fullStop\$

but those spaces are asking for trouble. As the program

carries on weather\$ is created by concatenation and line 60

68 PRINT "It's raining" space\$+weather\$+

produces the same output as the previous line 60?

could be:

O

O

### Sixth part of TREVOR ROBERTS' down-to-earth series

0	Old and New
00000	By now you should have grasped how CLS clears the screen but leaves the program in memory intact. Sometimes you'll want to get rid of a program completely.  The way to do this is to use the command NEW. Try it and see. Any program in memory disappears. You can't LIST it and you certainly can't RUN it.  NEW is a very powerful command, to be used with care. Happily if you do use it by mistake and you haven't typed in any other program lines, you can recall the program with OLD. Try it and see.
4	-
0	Order, order
0	Although they're very different the previous two programs do have a lot in common.
0	For a start they sit in memory not doing anything until they're RUN. And they can be listed out with LIST. But there's more than that.

Have you noticed anything about the RUN command? All it

does is tell the Electron to run the program but it doesn't tell it

The Electron figures this out for itself by looking at the line numbers (the numbers found at the beginning of the program

It performs this line (in both the above programs it was line

10) and then looks for another. Again it picks the lowest

number it can find that hasn't been performed. In this case it's

Now this might seem fairly obvious but it's quite important to grasp that the Electron runs its programs one line at a time, one after the other in a fixed sequence. And this sequence

Having said that, how does the Electron know when to

stop? The answer is that the program stops when the Electron

In the first program this is after it has processed line 40; in

the second after it has dealt with line 60. There are no more

20. Once that's done, it goes on to the next line and so on.

lines) and picking the lowest it can find.

depends on the line numbers.

lines left so the program halts.

can't find any more lines left to run.

where to start.

0

O

0

### More orders Try typing in the following program exactly as it stands: 0 28 PRINT "of entry" 48 PRINT "matter" 0 18 PRINT "The order" 30 PRINT "doesn't" 0 As you can see, the line numbers don't follow any specific order. First there's line 20, then line 40, next line 10 and finally 0 line 30. It's a right jumble. So what's going to happen when we RUN the program? Will the screen show: of entry 0 matter The order 0 doesn't :10 0 0 The intentions of numbering in tens 0 Still on the subject of line numbers have a look the next program: 23 PRINT "Look at" 67 PRINT "these" 0 183 PRINT "line numbers" and see if you can spot what's different. The answer is, of course, that the line numbers look wrong. Up to now all our programs have had the lines numbered 10, 20, 30 and so on. In other words they've started at 10 and gone up in 10s. With this program it's very different. The question is, will it still work when you enter RUN? The answer is yes. The program doesn't have to start at line 0 10, it can start at almost any number. And successive lines don't have to go up in 10s. The Electron just picks the lowest numbered line and does it, then looks for the next lowest, does that and so on. From this you'll see that it's perfectly possible to have a 0 program: 0 1 PRINT "Programming" 2 PRINT "is" 0 3 PRINT "easy" where the line numbers start at 1 and go up in 1s. However, 0 while the Electron will accept it and the program will work, it's not very flexible. 0 Suppose you wanted to add another line between lines 2 and 3. What line number would you use for it? 2.5? 0 Try it and see. You'll find that Basic only allows whole numbers at the beginning of lines. This is why it's normal to number the lines as we have done, 0 starting at 10 and going up in 10s. To see it, modify the program so 1, 2 and 3 are replaced by 10, 20 and 30. 0 However, don't bother using NEW to get rid of the 1, 2, 3 program, the Electron will rejig the line numbers into the usual pattern for you. All it needs is the command RENUMBER (not forgetting to press Return). The result is that the program becomes: 18 PRINT "Programming"

20 PRINT "is" 38 PRINT "easy"

0

0

The order of entry doesn't matter

Again, try it and see. And if you've understood what you've read about the Electron always looking for the lowest line number and starting from there, you should have no difficulty in seeing why it's the second lot of output that appears.

Just to confirm it, do a quick LIST which will show:

18 PRINT "The order" 20 PRINT "of entry" 38 PRINT "doesn't" 48 PRINT "matter"

proving that even though you entered the lines in the wrong order, the Electron can still sort them out.

as you'll see if you LIST it. Now if we want to slip in another line, it's easy. Just pick a line number that comes in between the numbers of the lines that will be on either side of the new line. So if we add:

25 PRINT "not"

a LIST will show the program as:

18 PRINT "Programming" 28 PRINT "is" 25 PRINT "not" 38 PRINT "easy"

Try doing that when the line numbers are 1, 2 and 3! Notice that I picked 25 when I could have used 22 or 27 or any number between 21 and 29. Can you think why?

And, to keep the line numbering to our standard, do a quick RENUMBER which renumbers the program as:

> 18 PRINT "Programming" 28 PRINT "is" 38 PRINT "not" 48 PRINT "easy"

Finally, since the program doesn't tell the truth, get rid of line 30 by typing in 30 and pressing Return. The result is:

18 PRINT "Programming" 28 PRINT "is" 48 PRINT "easy"

You'll see from this that just typing in a line number by itself and pressing Return deletes that line from the program.

And unlike after NEW, you can't use OLD to fetch it back. It's gone for ever.

For practice, play around with line numbers - and see if you can answer these questions:

Can you use 0 as a line number?

What's the highest line number you can have?

 And that is where we part company for this month. Next time we'll be looking at more programs.

### ONE of the most useful features of the BBC Micro is its ability to access software on rom. Five sockets are provided on the main circuit board, two are taken up by the operating system and Basic which leaves three empty.

These sockets are commonly filled with a DFS, word processor, toolkit or whatever.

Although the Electron has the software within its operating system to enable it to access sideways roms, unfortunately it hasn't got the hardware to enable them to be plugged in.

However, adding a Plus 1 provides you with two multipurpose sockets (among other things), which can be

Products: Advanced Rom Adaptor 1 (£10.35) Advanced Rom Adaptor 2 (£14.95) Supplier: Advanced Computer Products, 6 Ava House, High Street, Chobham, Surrey GU24 BLZ. Tel: 0276 76545

Product: Peartree Master Cartridge Price: £9.14 Supplier: Peartree Computers, St George's House, 14 George Street, Huntingdon, Cambs PE18 6BD. Tel: 0480 50595

Product: Slogger Twin Rom Cartridge Price: £12.95 Supplier: Slogger, 107 Richmond Road, Gillingham, Kent ME7 1LX. Tel: 0634 52303

Product: Standard cartridge with two IC sockets (£7.95). Cartridge with one Zif and one IC socket (£13.57). Cartridge with two Zif sockets (£18.63). Supplier: Care Electronics, 800 St Albans Road, Garston, Watford, Herts WD2 6NL. Tel: 0923 672102

Product: Eprom Plus Price: £15.95 Supplier: Expandor Systems, 99 Staley Hall Road, Stalybridge, Cheshire SK15 3DP Tel: 061-303 7646

## Cartridge survey

## ROLAND WADDILOVE evaluates eight of the market leaders

put to a variety of uses.

Perhaps the most common use is for cartridges containing software on rom, and probably the most well known of these is Acornsoft's View.

These cartridges contain an ordinary rom soldered on to a small PCB, and unless you're pretty adept with a soldering iron they can't be used for any other rom software.

Fortunately many third party hardware suppliers can provide blank cartridges. These contain an empty rom socket mounted on a small PCB.

The advantage of a blank cartridge is that it can be used for any rom software – simply plug the rom in the socket and plug the cartridge in the Plus 1.

The cartridge is reuseable so you can unplug it at any time, open it up and replace the rom with another.

There are many cartridges to choose from - take a look at the photograph accompanying this article. So what are the advantages and disadvantages of each and which is the best?

There are no simple answers here because it all depends on what you require from your cartridge, and my needs are probably different from yours.

Ask yourself how many roms you are likely to buy before deciding on any particular one. Do you need one socket, two or more? Are you going to be swapping roms frequently?

If you are likely to be buying several roms, obviously you'll need several sockets and the Expandor Systems board is probably best in these circumstances.

This will take up to four roms and a bank of four switches enables you to select any rom, though you can only use one at a time.

Are you going to be inserting and removing roms regularly? If so, a cartridge with ZIF sockets would be an advantage. A ZIF socket – Zero Insertion Force – means that it requires little effort to insert the rom.

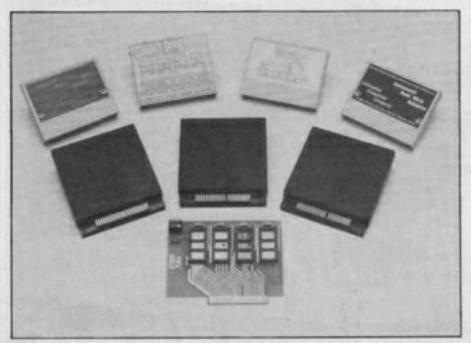
The pins on a rom are quite easy to bend when pushing it into a socket and it's quite easy to ruin a perfectly good unit. A ZIF is designed to prevent this from happening.

Care Electronics cartridges can be supplied with either one ZIF and one ordinary socket or two ZIF sockets.

If you simply want to use one particular rom, ACP's Advanced Rom Adaptor 1 is well worth considering. It contains a single socket and is also quite cheap.

However, for a couple of pounds more Slogger's cartridge enables you to plug in two roms and the sockets are slightly better as well.

To sum up, each cartridge has its advantages – it all depends on what you require. My advice is to first decide how many and which roms you intend to buy, then choose the cartridge which enables you to use them best.



Top row (left to right):
Advanced Rom Adaptor 1,
Peartree Master cartridge,
Slogger Twin Rom cartridge,
Advanced Rom Adaptor 2.
Middle row: the Care range.

Bottom row: Eprom Plus





Word Processor: Ideal for writing letters and reports. There is a constant display of both time and word count. plus a words-per-minute display to encourage the budding typist! A unique feature is the double-size text option in both edit and printer mode - perfect for young children and people with poor

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Spreadsheet: Enables you to use your micro for home accounts or pocket money records. It creates a display of numbers in rows and columns. Continuous updating is possible, and a changed figure can be instantly reflected throughout the rest of the spreadsheet. Your results can be saved, to be used for future updates, or can be fed into its associated program . .

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## POOLS



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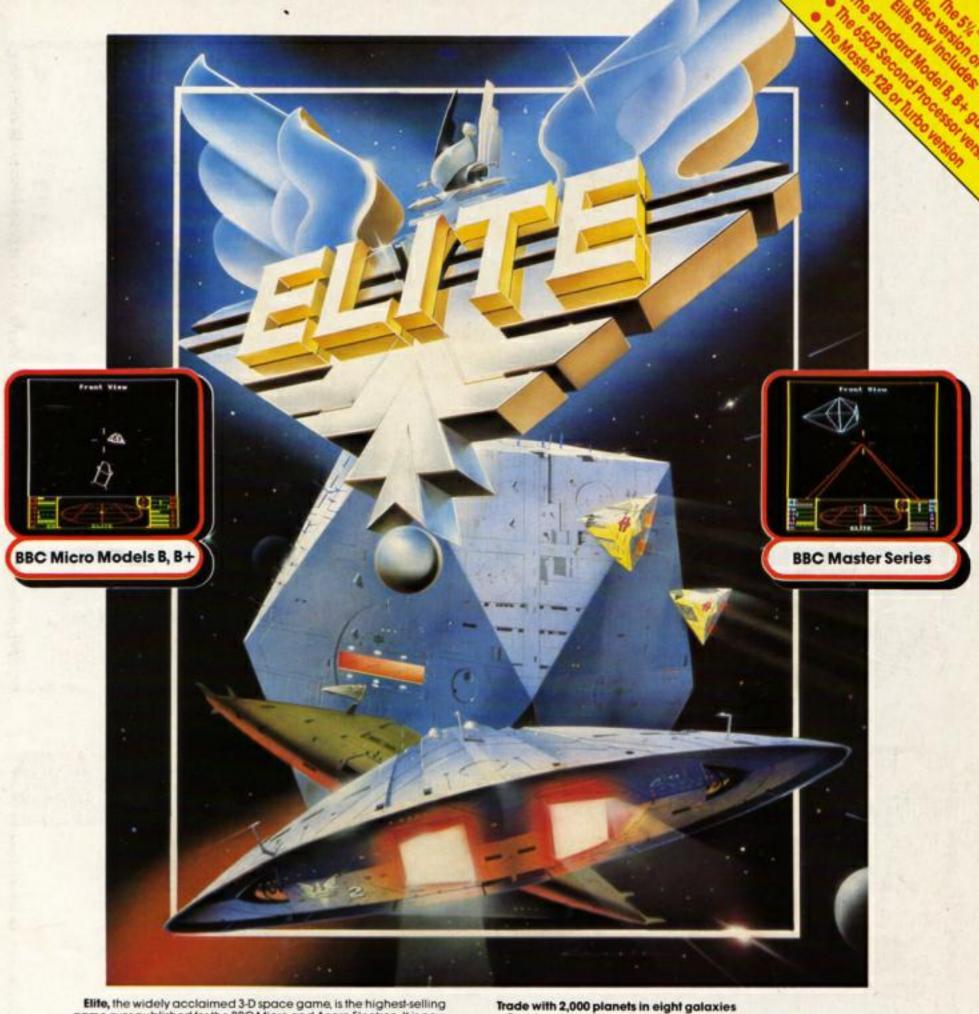


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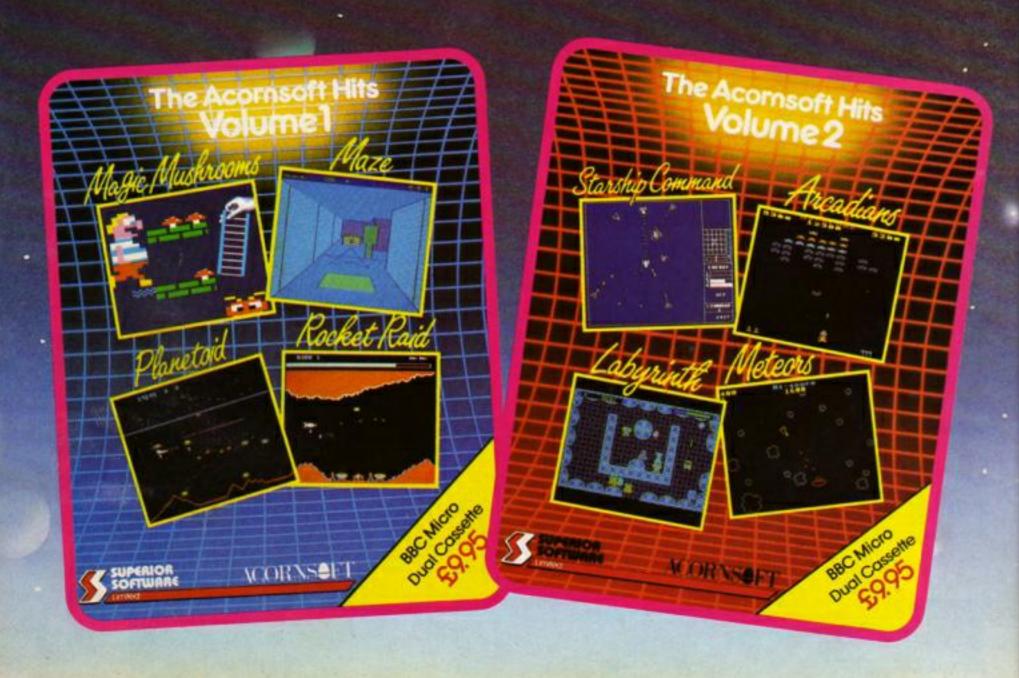


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